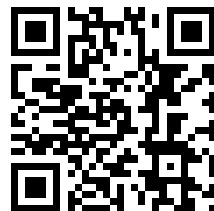

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The Book of Knowledge

The Children's Encyclopædia

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Volume XI.

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THE HISTORY OF OUR LAND

NOW we come to speak of the recent history of our land and to consider how great a country we live in. Few countries in the world are so large, for 3,000,000 square miles means a great territory, twenty-five times as great as the British Isles, in fact. In this article you learn something of the size of our country, of the different soils and climate, and of the crops we grow. You find that we have in the past helped to feed and clothe the world, and that we shall continue to do so for years to come. But our own country is growing so rapidly in population that some day we shall need our crops to feed our own people. We shall be able to send out cotton and cotton goods for a long time to come, as nowhere else can cotton be grown so well as in the South.

THE UNITED STATES TODAY

IN the ninth volume of our book, we mentioned that General Grant was twice elected President of the United States. His second term expired in 1877, and soon after he set out on a trip around the world. Two men claimed to have been elected to succeed him. One was Samuel J. Tilden of New York, and the other, Rutherford B. Hayes of Ohio.

A DISPUTED ELECTION CAUSES ALARM

It was very hard to know who was really elected. In one of the Southern States there were two governments, each claiming to be the right one. In other states there were many charges of fraud, and many laws had not been obeyed. The time for the new President to take office was coming and no one could say which of the two candidates was entitled to the office. So a special court, called an Electoral Commission, was formed, and decided in favour of Hayes, who took his seat, but many people believe to this day that Tilden was rightfully elected.

During this administration all United States soldiers were called back from the Southern States, which were allowed to govern themselves. As soon as the soldiers were gone, the "carpet-baggers" and negroes lost all power.

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Though President Hayes was in many ways a good President, the charge that the office really did not belong to him had some effect on his popularity, and in 1880, another Ohio man was chosen. This was James A. Garfield, but he had been in office only a few months when he was shot by a man who had become half-insane because of disappointment at not receiving an office. The Vice-President, Chester A. Arthur, of New York, became President and served the remainder of the term.

THE FIRST DEMOCRATIC PRESIDENT SINCE THE WAR

At the election in 1884, Grover Cleveland, then Governor of New York, was chosen. President Cleveland was a Democrat and was the first President of that party since James Buchanan. For twenty-four years every President had been a Republican. But the Democratic party did not have entire control of the government, as during the four years a majority of the senators were Republicans. During this term there were great strikes in different parts of the country. A "strike" is the refusal of men to work longer for their employer. The railway strike in Chicago was so serious that President

Cleveland called out United States soldiers to protect lives and property.

After the end of the Civil War, the wooden ships of the navy had been allowed to rot, and the monitors, as the iron ships were called after the first one, had rusted away. The country had no navy worth mentioning when Cleveland became President. During his term we began to build modern warships and have continued until now our navy is next to that of England in strength.

Mr. Cleveland was again a candidate in 1888, but was defeated by Benjamin Harrison of Indiana, a grandson of President William Henry Harrison. Though he was a man of great ability, he was not very popular, and in 1892 Cleveland was again elected. He is the only President in our history who has served two terms not in succession.

A GREAT EXPOSITION HELD IN CHICAGO

A celebration of the four hundredth year since the discovery of America by Columbus took place in Chicago in 1893, as the buildings could not be gotten ready in 1892. This World's Fair, as it was called, was the most wonderful collection of the manufactures and products of the world that had ever been seen.

When the election of 1896 arrived the Republican candidate, William McKinley, another Ohio man, was chosen. The most important event of his administration was the Spanish War, of which you were told in the tenth volume. President McKinley was re-elected in 1900, but only a few months after his second term began, he was shot by an anarchist, while in Buffalo, New York, attending another exposition, and soon died.

The Vice-President, Theodore Roosevelt, became President and finished the term, and was himself elected for a full term in 1904. Mr. Roosevelt was one of the most active Presidents the country has ever had. He visited all parts to make speeches, went to see how the work was being done on the Panama Canal, and took great interest in everything. At the end of his term he spent more than a year hunting in Africa and told of his adventures in a large book.

OHIO THE NEW "MOTHER OF THE PRESIDENTS"

Mr. Roosevelt was succeeded by William H. Taft of Ohio. That state seems to be likely to take away the title, "Mother of the Presidents," from Virginia, as so many of our recent Presidents have been elected from Ohio. Mr. Taft has had much experience in government. He was the first governor of the Philippines, has served as Secretary of War, and when the United States sent the second army to Cuba, took charge of the government until the island was quiet again.

At the end of Mr. Taft's present term, our government will be one hundred and twenty-four years old. During that time twenty-six different men have served as President though only twenty-two of them were elected. Five Vice-Presidents became Presidents because of the death of the men who were elected.

VICE-PRESIDENTS WHO SUCCEEDED TO THE OFFICE OF PRESIDENT

These were John Tyler, who succeeded William Henry Harrison after only one month of the term had gone; Millard Fillmore, who succeeded General Taylor; Andrew Johnson, who filled out the greater part of Lincoln's second term; Chester A. Arthur, who succeeded Garfield; and Theodore Roosevelt, who served nearly three and a half years of McKinley's second term. Mr. Roosevelt is the only one of these five who was himself afterward elected for a term as President.

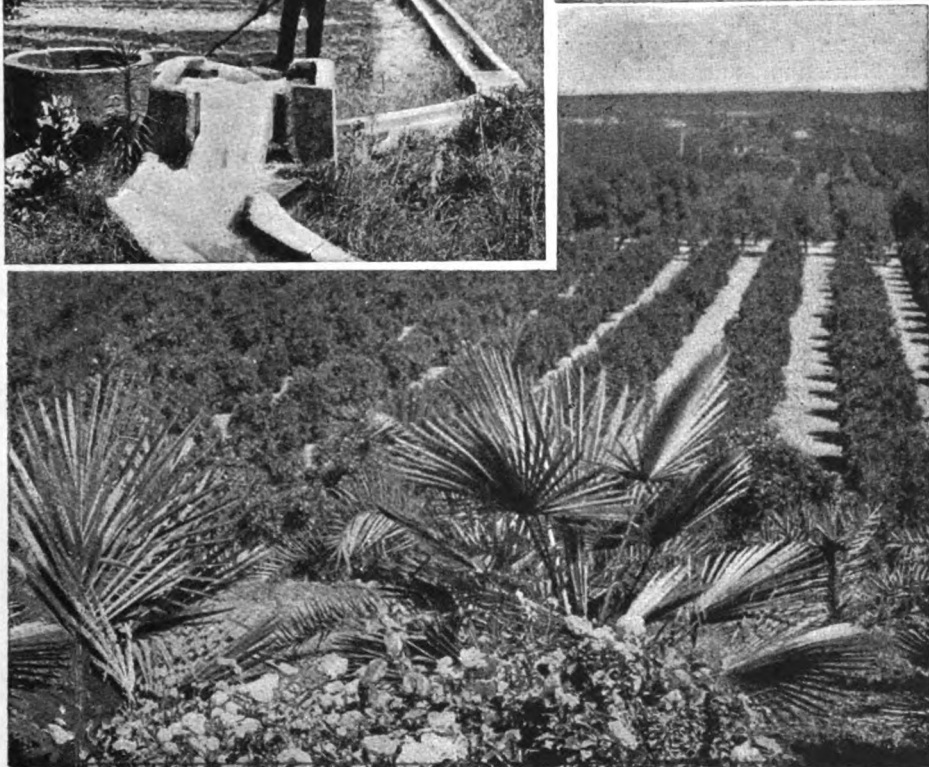
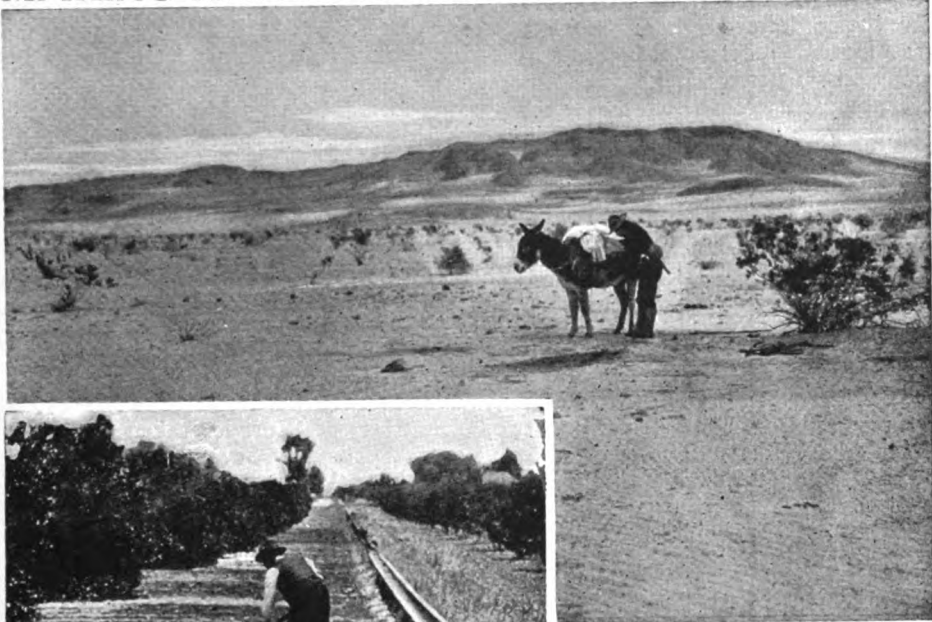
One fact which we must consider with shame is that three of our Presidents were assassinated within forty years. It seems horrible that such a thing should occur in a free country, where every one has a voice in the government, and where there is no chance of a President becoming a tyrant.

Of all our Presidents nine have been twice elected, though Lincoln and McKinley did not fill out their second terms. Cleveland was elected, then defeated, and then elected again.

WHERE OUR PRESIDENTS LIVED

All of our Presidents were born east of the Mississippi River and most of

MAKING THE DESERT BLOSSOM AS THE ROSE



Here we see the wonderful results of the energy of the people of the great West. In their advance across a vast continent they came to arid deserts like that in the top picture, on which rain rarely falls. They set to work, however, bored wells, and dug waterways to fetch water from the distant mountains and rivers. This water they guided into a vast network of irrigation channels, and made the desert soil so fertile that to-day, after forty years, we see such luxuriant orange-groves as in the bottom picture. In the centre picture we see water flowing from a well into an irrigation channel, and so the want of rain does not matter at all to these busy people.

them have come from a few states. Five came from Virginia. These were Washington, Jefferson, Madison, Monroe and Tyler, though two more, William Henry Harrison and Zachary Taylor, were born in that state. Ohio has also furnished five and their names have been given you. Five have lived in New York, Van Buren, Fillmore, Arthur, Cleveland and Roosevelt, but only three of these were chosen by the people. Three lived in Tennessee, Jackson, Polk and Johnson, but all three of these were born in North Carolina. Massachusetts has had two, John Adams and John Quincy Adams, father and son. Illinois has had two, Lincoln and Grant. Louisiana had one, Taylor; New Hampshire had Pierce, Pennsylvania had Buchanan, and Indiana was the home of Benjamin Harrison.

The West is growing so rapidly in population, wealth and influence, that before many years we shall see a President elected from the region beyond the Mississippi, and perhaps one from west of the Rocky Mountains.

Every ten years the men appointed by an office in Washington, called the census office, count all the people, men, women, and children, alive on a certain day. They also collect many other facts, but the counting of the population is most important.

WHAT THE CENSUS SHOWS OF THE GROWTH OF OUR COUNTRY

The census of 1910 showed that there were in the United States proper, on April 15 of that year, the great number of 91,972,266 people. If to these we add the population of Alaska and our island possessions, the number goes beyond 101,000,000. The first census was taken in 1790, a hundred and twenty years before that of 1910. Then the population was about 4,000,000. This shows a wonderful growth.

The state with the largest population is, as might be supposed, New York, which has 9,113,614, and Pennsylvania comes second with 7,665,111. The state with the smallest population is Nevada, which has only 81,875 people. This state ought not to have been admitted, as only a small portion is

suitable for agriculture, because of the small amount of rainfall. Perhaps some day more land can be made fertile by irrigation.

The largest city is New York, with 4,800,000 people, which makes it the second city in the world. Chicago and Philadelphia rank next in size, and these three are among the ten largest cities in the world.

THE EXTENT OF OUR COUNTRY

Not counting the foreign possessions, our country extends over more than 3,000,000 square miles. This means that our country is larger than all the countries of Europe taken together except Russia. Several single states are larger than most of the countries of Europe.

VARIETIES OF SOIL AND CLIMATE

Within the United States is almost every kind of soil and climate. On the rocky hillsides in Maine and New Hampshire very small crops are raised, while the broad prairies of the Mississippi Valley, and the lowlands along the seacoast and rivers have some of the richest land in the world. Somewhere in the vast extent is soil which suits almost every crop.

In the most northern sections, the winters are so long and the summers so short, that only a few quickly growing plants can grow. In the far South, in Florida, Louisiana, Texas and Southern California, it seems always summer. In some parts of the country, there is almost constant rain. In other parts rain seldom falls.

There are real deserts to be found, while in other parts much land has been reclaimed from the sea or from the rivers, just as we know has been done in Holland and Belgium. Much land along the lower part of the Mississippi is lower than the river, and great banks of earth called levees keep the water back from the land.

CORN, THE MOST VALUABLE CROP WE RAISE

Corn is the most valuable crop. We grow three-fourths of the world's supply of this wonderful grain, which is so valuable for human food, as well as for

LOOKING DOWN A NEW YORK STREET



New York, the commercial capital and chief port of the United States, is built on a narrow island. This means that as the city grew there was not as much room as people needed for building. So, instead of spreading buildings over the ground, they have been built high in the air, until New York is now largely a city of "skyscrapers," as we usually call them. Broadway, shown in this picture, is the principal street in New York, and is like no other street in the world. A great part of it is like a deep ravine, lined on each side with buildings from ten to more than thirty storeys high, and at some points the sun seldom reaches down to the level of the street.

horses, cattle and hogs. There is no more beautiful sight than a great field of waving corn.

The next crop in value in most years is hay, though little of this is sent abroad. Many grasses are dried to make this crop. Some grow wild without care and what is gained from them is almost entirely profit. In other sections the seed is sown, though not every year. Clover, timothy, red top, alfalfa, certain varieties of peas and beans, and many other seeds are sown.

The crop for which the world is most dependent upon us is cotton. In no other country can cotton be grown so easily as in our Southern States, and though we have many busy factories, much more than half of the crop is sent abroad. Egypt and India grow cotton also, but there is not land enough in Egypt, and in India the climate does not allow the best kinds to grow. If a machine to pick the cotton in the fields could be invented, the United States could easily supply the whole world.

MILLIONS OF DOLLARS ONCE THROWN AWAY

Only a few years ago the seeds of the cotton were thrown away, and were considered a great nuisance. Now they are ground, the oil is pressed out, and what is left is used for a fertiliser or for food for cattle. The hulls also are fed to cattle. The oil is used for many purposes, and some dishonest dealers put false labels on the bottles and sell them as olive oil. Altogether the value of the products of the cotton seed, once thrown away, amount to more than \$100,000,000 a year.

Our next crop in value is wheat, of which we grow nearly a fourth of all grown in the world. Some wheat is grown in most of the states, but it is in the newer states of the Gulf Slope, of which you were told in the first volume, that the largest fields are to be found. We have been using about three-fourths of our crop ourselves, and sending the remainder to help feed hungry Europe, but if our population continues to increase so rapidly, we shall not have much to spare before

many more years have gone. Great wheat fields are being developed in Canada, however, and so America will continue to be the granary of the world for a long time.

OTHER CROPS GROWN IN OUR COUNTRY

Our next important crop is oats, of which we grow a great quantity. Perhaps you have oatmeal for breakfast every morning, but the horses get much more than we do.

The next crop is also one not much of which is sent abroad. This is the white or Irish potato, but the crop is worth more than \$150,000,000 a year. We grow great quantities of sweet potatoes, but they are nearly all eaten in this country also.

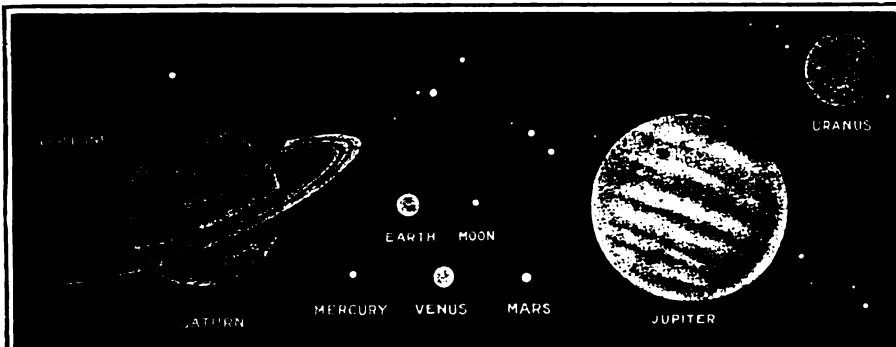
The next crop in value is one with which boys and girls have nothing to do. This is tobacco, of which we grow more than a third of the world's supply. Some of the factories which prepare this plant are very large and employ thousands of men, women and children. This is a luxury, but it is one men will go without necessities to gain.

Next we come to sugar. We use more than any other people of this, one student says, seventy pounds a year for every man, woman and child. We cannot begin to raise all we need, though we grow sugar-cane in the South, sugar-beets further north, and get a little maple sugar from other states.

These are only a few of the crops we raise, but they are the principal ones. We raise in the Southern States about half the rice we use, and the amount of flax raised for its seeds is large. Linseed oil, used in painting, is made from flax seeds. We grow rye, barley, buckwheat and many kinds of fruit and vegetables. In California and Florida, oranges, pineapples and other tropical fruits are grown, while apples, peaches and pears grow in many parts of the country. We are beginning to send some of our fruits abroad, as it is possible, by packing them in ice, to deliver them in good order, thousands of miles away.

In our next article we shall tell you more about this wonderful country of ours.

Continued on page 2657.



These pictures show the earth and the other planets that move round the sun in space. They are shown here in their different sizes as compared one with another; Jupiter is 1,200 times as big as the earth.

THE SUN'S FAMILY OF WORLDS

WE must now study the other planets of the solar system. There is now probably no doubt that the innermost planet is Mercury, and that a planet going round the sun still closer than Mercury does not really exist, though some astronomers have thought that they had seen it. It may be that in the future astronomers may discover that those were right who thought they saw the planet which they called Vulcan; but for us, at any rate, the innermost planet is Mercury. Its discovery goes back a very long way. Indeed, though Mercury is by no means easy to see, and though such a mighty astronomer as Copernicus, for instance, never saw it, yet we know that, so far back as the records of astronomy go at all, Mercury was already known.

If we little people are more fortunate than Copernicus, and get a view of Mercury, we shall probably see the planet as a crescent, or, at any rate, as very like one or other appearance of the moon. This, we understand at once, must be the case with both Mercury and Venus, as these are planets very like the earth or the moon or Mars, in that none of them can shine of themselves, but can only reflect the sun's light. As Mercury goes round the sun, one half

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of the planet is always lit up by the sun's light, and what we see of Mercury or Venus, as in the case of the moon, entirely depends upon how much we can see of the half of the planet that is turned towards the sun. I am afraid we know really nothing yet as to what the surface of Mercury is like. This is not due so much to the fact that Mercury is small, as to the fact that it is so bright—because, of course, it is very near the sun. Indeed, Mercury is so bright that with the naked eye we cannot see its shape at all, and even through the telescope it glitters too much for us to make out any features of its surface. The temperature of Mercury must, however, be so hot that nothing at all like life, as we know it, can be possible there yet; and so it matters little that we know nothing about Mercury's surface.

We do know, however, certain very interesting facts about Mercury. The planet is not very large, but is larger than the moon. It is very easy to remember that the diameter of Mercury is just under 3,000 miles. It has also been shown that the planet is very heavy in proportion to its size; or, in other words, it is very dense. The density of Mercury is considerably greater than that of the earth, and it is the densest of all

the planets. The year of Mercury is just about 88 of our days; or we may say that Mercury goes right round the sun in what we call about three months.

We know that all the planets move round the sun, not in circles, but in the kind of path which is called an ellipse. This is true of all the planets, and it depends upon the law of gravitation. But as a rule the path of a planet, though an ellipse, is so very nearly a circle that we might almost call it a circle unless we studied it very carefully.

THE PLANET MERCURY, WHERE THE YEAR IS ONLY THREE MONTHS LONG

Mercury, however, is peculiar because its path is very much more elliptical, or more this shape, , than that of any of the other planets, including, of course, the earth. The average distance, or, as astronomers say, the *mean* distance, of Mercury from the sun is about 35,000,000 miles, but its path is so elliptical that the least distance of the planet from the sun is only about 28,500,000 miles, and its greatest over 43,000,000. Mercury is very near the sun in any case, and so must always be very hot. But these differences of distance are so great, and succeed each other so quickly—for the planet's year is only three months—that it is impossible to imagine how any kind of life could endure there.

We are now able to say that the planet has an atmosphere, and perhaps a very dense one. It probably rotates upon its axis, and there is some reason to believe that this rotation takes just as long as the planet takes to go round the sun, thus offering something very similar to what we saw in the case of the moon.

It is not possible to learn much about the composition of Mercury, for the light we see it by is only sunlight, reflected from its atmosphere, and tells us little. But there is not much doubt that Mercury has water in its atmosphere; we believe that it has no moon.

THE BRIGHT WORLD THAT TRAVELS BETWEEN MERCURY AND OURSELVES

The planet Venus travels between Mercury and ourselves, and so this planet also appears to us in phases like the moon and Mercury. The planet is much larger than Mercury, its diameter being not very much less than that of the earth, say, 7,760 miles. as compared with nearly 8,000. The

nearness of the planet to the sun—its average distance is about 66,000,000 miles—gives it its great brilliance—brilliance entirely due to sunlight, of course. Venus is brighter than Jupiter, though Jupiter is vastly larger, and gives out some light of his own besides reflecting sunlight. But when we make these comparisons we are always thinking of how things look from the earth. We should remember, then, that Jupiter is millions of miles farther from the earth than Venus is. Just as we may learn from the brightness of the sun, which is not by any means a very big star, or from the brightness of the moon, which is really but a grain in the heavens compared with any star—so we may learn from the brightness of Venus that it is *nearness* which gives a thing value in our eyes; and that it is the business of our *mind's* eyes to find out which things are really the brightest and biggest, and which things are really the most important for the universe and in the universe—whether they be near to us or far from us.

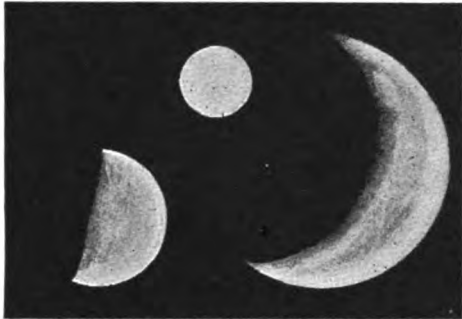
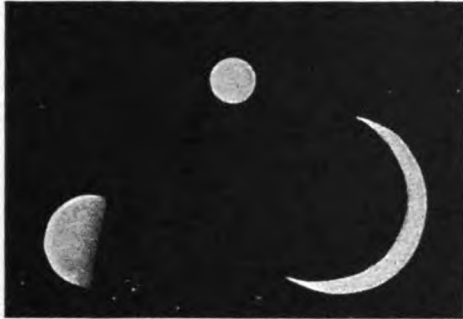
THE STAR THAT CAN SOMETIMES BE SEEN IN DAYLIGHT

Leaving the sun and moon out of account, Venus is queen of the heavens as we see them—brighter not only than Jupiter, but also than the brightest of the stars.

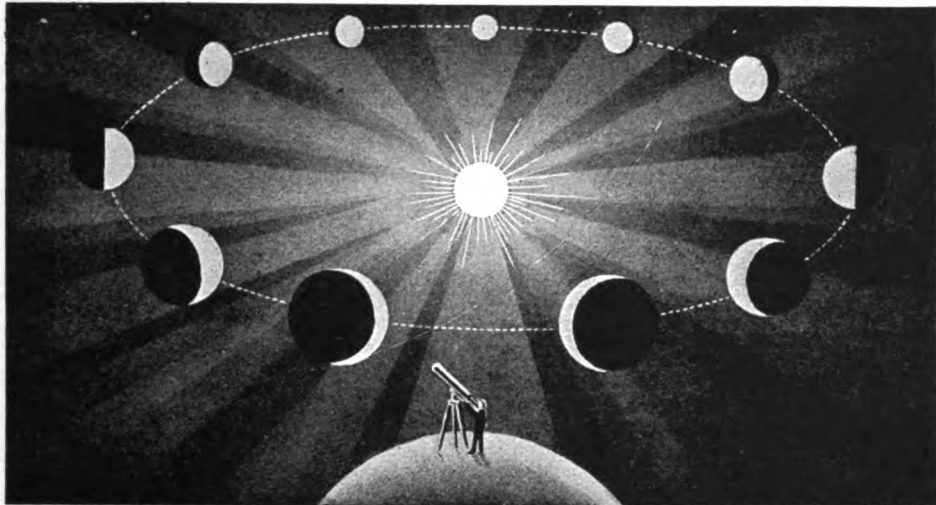
When Venus is at its brightest, it can be seen by the naked eye in daylight, and that cannot be said either of Jupiter or of Sirius, which is the brightest of the stars as we see them. This intense brightness is entirely due, we know, to reflected sunlight, for the part of the planet on which at any time the sun's light does not fall is just as dark as we see in the case of the moon. The discovery of the *phases* of Venus, by which we mean the forms which she assumes at different times, was made by Galileo, as we read elsewhere.

We know scarcely anything about the surface of Venus, though we have evidence that the planet has an atmosphere. The mean distance of Venus from the sun is about 66,000,000 miles, and though its path must, of course, be a true ellipse, it is more nearly a circle than in the case of any of the other planets. The year of Venus is about 224 of our days. It is very likely that, as in the case of Mercury's

OTHER WORLDS AS SEEN FROM THE EARTH



Like the moon, Mercury and Venus are always changing their appearance to us, but this can only be seen through a telescope. The left-hand picture shows Mercury. It looks like a crescent when nearest the earth, and as more of it comes into our view it gets smaller, until we see the whole planet at its farthest distance as a small ball. The right-hand picture shows the different appearances of Venus as astronomers watch it going round the sun.



Mercury and Venus are nearer to the sun than we are, and this picture shows how they appear to us from the earth, and why at different times they have different shapes. When the sun shines full on the side that we see, the planets are farthest away and appear small, but when we see only a crescent of light they are nearer and appear bigger.



Some astronomers think they can see double canals on Mars, while others say this is only a false appearance caused by the telescope, and that the canals are single. In the left-hand picture the canals are shown double, and at the top is the South Pole of Mars, white with gleaming ice. The dark funnel-shaped part is thought by some to be sea. The right-hand picture shows the same half of Mars tilted up more, showing the North Pole, which is the white patch at the bottom. Here the canals are shown single, as other astronomers think them to be.

movement round the sun and the moon's movement round the earth, Venus spins on herself in the same time as she takes to go round the sun. Like Mercury, Venus has no moon, or satellite.

WHERE WE SHOULD MEET THE EARTH IF WE WERE TRAVELLING FROM THE SUN

If we were travelling outwards from the sun, and studying the planets as we came to them, we should next meet a body very like Venus in some ways ; indeed, hardly different from Venus in size. The mean distance of this body from the sun is rather less than 93,000,000 miles ; its year is about 365½ days, but its day, instead of being as long as its year—as we have seen in the case of the first two planets—is very much shorter, being just under twenty-four hours. This planet, unlike the two we have discussed, possesses one moon. What name the inhabitants of Mars apply to it—if there are any inhabitants of Mars—we do not know, but that group of its inhabitants who speak the language in which this book is written call it *the Earth*.

Travelling farther outwards, we come to the wonderful planet Mars. In the case of Mars, as in that of all the planets farther from the sun than the earth is, of course we do not see phases as we do in the case of the moon, Mercury, and Venus. But even the crescent of Venus is brighter than Mars, except, perhaps, at certain times, even though we always see the whole of the lighted half of Mars. The planet is reddish in colour, thus suggesting blood, which suggests war, and this led to naming the planet after the god of war. Mars certainly gives out no light of its own, any more than Mercury, Venus, the earth, or the moon do. There must be something on its surface which gives the red tint to the sunlight which it reflects. It is probable that the planet is largely covered by great stretches of sand, which would explain its reddish colour.

HOW MARS COMES AT TIMES VERY NEAR TO THE EARTH

Mars, of course, moves round the sun in an ellipse. This ellipse is very much farther from being a circle than in the case of the earth's orbit. Indeed, only Mercury has a more elliptical path than that of Mars. Kepler's great discovery of the movements of the planets and their laws largely depended upon watching

the orbit of Mars, and it was Kepler's studies from which Newton, in his turn, discovered the law of gravitation.

Now, as the earth travels round the sun in what is very nearly a circle, while Mars travels in what we might call a rather oval path, outside the path of the earth, it follows that the distance between Mars and the earth varies a good deal. The year of Mars amounts to about 686 of our days, and so it is at regular intervals of years, as we call them, that Mars and the earth come nearest to each other. At the most favourable times Mars and the earth may be only 35,000,000 miles apart. If you draw a little picture for yourself, showing the sun, with the earth going round it, and Mars, farther away, also going round it, and if you remember that the earth is going round much more quickly than Mars, you will see that times must constantly return when the earth, rushing round, comes to lie just between the sun and Mars. When the sun, the earth, and Mars are in the same straight line, that is called the *opposition* of Mars—for, from the earth's point of view, the sun is on one side and Mars on the other, the two being opposed, or *opposite*, to each other.

THE GREAT QUESTION WHETHER THERE IS LIFE ON MARS

Of course, if Mars and the earth both moved in circles, the two planets would be equally near to each other at every opposition. But as the two paths are not of the same shape, that is not so. The two planets were very near each other at the opposition of 1892, and also in 1877, when the two moons of Mars were discovered.

The next favourable opposition was in the year 1909, when astronomers were expecting to learn, with their splendid new telescopes and instruments for studying light, much more about Mars than we have ever learnt before. The great question about Mars is whether it is inhabited by intelligent beings, and though I should like to spend a lot of time in discussing that question, I think it is better not to do so, just because we have learnt much more about the planet recently. One thing, however, we must learn, and that is the great fruit of knowledge gained from the two oppositions, which have added much to our knowledge though not so much

as we hoped. We have learnt, beyond all doubt, that there is water upon Mars, and we do not need to remind ourselves how important that is in its bearing on the question whether life of any kind can exist on the planet.

IS THE SURFACE OF MARS LIKE THE SURFACE OF THE EARTH WILL BE?

The average distance of Mars from the sun is 140,000,000 miles. The least and the greatest distances are 128,000,000 and 155,000,000 miles, a great difference, which shows us how far from circular the planet's path is—because, of course, if it went round the sun in a circle Mars would always be at the same distance from the sun. We have already seen the length of the year of Mars, which is 686 of our days. The diameter of the planet is about 4,200 miles. This is only little more than half the diameter of the earth.

The size of Mars largely explains, as in the case of the moon, the fact that the history of the planet has been a quicker one than that of the earth, and so we believe that the surface of Mars represents in many respects what the surface of the earth will be like in some distant age. The two things we specially note are, first, that the outside of the planet seems to have lost the greater part of its water; and, second, that the ages have worn its surface down to a great smoothness, just in the fashion which we seem to see going on in the case of the earth. If you ask why the moon has not been worn smooth in the same way, the answer is that the moon has no water or atmosphere to do the work. Mars has both.

HOW THE CAMERA IS DISCOVERING ANOTHER WORLD FOR US

Fortunately for us, Mars spins upon itself, not as Mercury and Venus do, nor as the moon does in relation to the earth, but at a rate quite different from its movement round the sun. This means, of course, that we are able to see all sides of Mars. It is, indeed, an amazing thing that we can see and study and map both Poles of Mars, though no human eye has ever seen some parts of the earth. The day of Mars is only about half an hour longer than the day of the earth; in other words, the planet spins completely round on its axis in rather more than twenty-four and a half hours.

The surface of Mars is largely covered with markings which look as if they had been made on purpose. For many years people said that these markings were only imagined, but they have now been photographed. Some people think that they are what they seem to be—canals made by intelligent beings and carrying water; but before we form an opinion on this we ought to wait for this year's knowledge. Only please remember one thing. The digging of a canal on Mars would be very much easier work than digging a canal of the same size on the earth, because the planet's mass is so much less than that of the earth, and in consequence it offers less resistance to lifting out the material when digging out the canal. We must just remind ourselves that Mars has two moons, and that the inner one travels round Mars about three times a day. It is possible to say "three times a day," because the earth's day and the day of Mars are just about the same.

A WONDERFUL GROUP OF LITTLE WORLDS LIT UP BY THE SUN

If we travel outwards from Mars, we encounter a large number of small planets, usually called the minor—which means lesser—planets, that travel in a zone, or belt, between Mars and Jupiter. It was supposed that these had been formed by some large planet being shattered to bits, but we are as yet quite unable to explain the history of this wonderful group of hundreds of little planets. The first was discovered on the first evening of the nineteenth century, and was named Ceres.

We have long given up naming the minor planets, however, and most of them are now known simply by numbers and letters. They shine, so far as we know, entirely by reflected sunlight. It is probable that, as we travel outwards from them, the other bodies in the solar system shine not only by reflected sunlight, but also by some light of their own. From Jupiter outwards the planets contribute more and more of their own light to the light by which we see them; and it is especially interesting if we compare these four planets—Jupiter, Saturn, Uranus, Neptune—to find that, as we travel outwards from the sun, each of these planets contains more and more *hydrogen*, which glows and contributes its own

kind of light to the light by which we see them. It is interesting that there should be so much of the lightest of the elements in the outermost planets.

Far away beyond Mars and the minor planets, at an average distance of 483,000,000 miles from the sun, we find Jupiter, the largest of the planets. The year of Jupiter is more than 4,380 of our days, so that we may reckon, if we please, how many times the little earth goes round the sun while Jupiter completes one of his mighty years. This great planet has a diameter of about 87,000 miles; but though it is so large, its distance from the earth greatly interferes with our study of it. At the most favourable oppositions—or when it is most favourably *opposite* to us—Jupiter is about four times as far away from us as the sun is, and as his diameter is only one-tenth that of the sun, it is difficult to learn much about him.

When we come to study Jupiter, we find at once a very great difference indeed from any of the planets we have seen yet. This is not the mere question of size, but something much more interesting—the material of which the planet is made. Jupiter is not a solid, but partly a liquid and partly a gas.

JUPITER, A PLANET AS BIG AS 1,200 WORLDS LIKE OURS

This fact about Jupiter goes, of course, with what we have already learnt as to the planet giving out some light of its own, like the gaseous sun itself, though on a very much smaller scale. This huge mass of matter spins upon itself at an extraordinary speed.

The day of Jupiter is less than ten hours long, and as Jupiter is so much larger than the earth, we can reckon that anything on the equator of Jupiter must be spinning round 27 times as fast as anything on the equator of the earth. That is the reason why Jupiter bulges so much at the equator. We said that the diameter of the planet is 87,000 miles, but that is the diameter taken through the equator. The diameter from Pole to Pole is about 5,000 miles less. All this is due to the very rapid spinning of a body which is not made of rigid solids, but of liquid and gas.

If Jupiter is so differently made from the other planets we have studied, we shall expect that it is nothing like so dense, nothing like so heavy in proportion

to its size, as the earth. Jupiter is about 1,200 times the size of the earth. But when we study the influence of the planet upon his own moons, or upon other planets, or upon comets, we find that his gravitation is just enough to mean that Jupiter is only about 300 times, instead of 1,200 times, as powerful as the earth. This means, of course, that the stuff of which Jupiter is made is, on the average, only about a fourth as heavy as the stuff of which the earth is made.

WHY IT SEEMS THAT JUPITER IS NOW LIKE THE EARTH USED TO BE

All this suggests to us strongly that, just as Mars and the moon represent stages in histories of worlds much later than the stage which the earth is now in, Jupiter represents a much earlier stage, such as the earth must have been in ages ago. Directly we ask why Jupiter should be so backward, as one might say, we see the answer at once. It must be because Jupiter is so big, and so loses his heat, and turns solid or freezes, as we might say, very slowly. If we compare the size and the present state of Jupiter, the earth, Mars, and the moon, we find the state of things just what we should expect. The smallest is the one that has, so to say, lived its life quickest, and the biggest is the one that is still young.

Jupiter has eight moons. It is possible that the outermost moon, and perhaps even more of them, may be really comets caught by the attraction of Jupiter, and compelled to travel round him. We can observe the influence of Jupiter's great size upon comets, and even upon the planets nearest him, and it is quite likely that Jupiter might catch a comet altogether. Such a comet would have no tail, and might appear like a moon to us.

The surface of Jupiter, like that of the sun, travels round at different rates in different parts. Maps of Jupiter differ from year to year. What the planet's future will be we can only guess.

SATURN, THE WORLD WHERE MEN WOULD BE OLD AT THREE YEARS OF AGE

Far out beyond Jupiter—indeed, almost twice as far as Jupiter from the sun—is the planet Saturn. Its average distance from the sun is about 870,000,000 miles. Its year is very nearly thirty of ours in length; it is not very much smaller than Jupiter,

having a diameter of over 70,000 miles. Like Jupiter, Saturn bulges much at its equator, and for the same reason. It is made of materials by no means rigid, and its day is only a little over ten hours, so that if there were men living on this planet, and they lived the same age as we do, they would be as old in three years as we are at ninety.

Like Jupiter, Saturn is very hot and light. We have probably never seen any more than the hot atmosphere of Saturn, just as we can see no farther than the hot atmosphere of the sun. Saturn is the least dense of all the planets—far less dense than the earth, or even than water. But it is so large that, though its density is so small, it yet weighs more than eighty times as much as the earth.

SATURN'S RINGS, UNLIKE ANYTHING ELSE WE KNOW IN THE SKY

Saturn has nine moons, and possibly more. The ninth has only lately been discovered, and moves in a very peculiar way. We must be careful not to take it for granted, as some people do, that the moons of all the planets were formed from these planets, as our moon was formed from the earth. It seems that this certainly cannot have been so in the case of the ninth satellite of Saturn.

But the great feature of Saturn is his rings, which are utterly unlike anything else we know in the sky. They were first seen by Galileo, but were not understood until after his time. The rings throw shadows on Saturn, showing that we see the planet mainly by reflected sunlight. We can prove that the rings cannot be solid, but must be made of separate parts. There seems to be no doubt that just now something is happening in Saturn's rings, and astronomers are closely watching the changes that are going on in them. Perhaps they may get broken up, and the stuff which makes them may be drawn into the planet, bringing the rings to an end.

URANUS, THE WORLD THAT LIES FAR BEYOND SATURN, AND HAS FOUR MOONS

Far out beyond Saturn, at an average distance of some 1,754 millions of miles from the sun, there travels another planet, known to mankind for only a century and a quarter, which is called Uranus. This planet, like Jupiter and Saturn, is still far from having shrunk down into hardness. It is some 31,000

miles in diameter, and its year is about 83 of ours, so that it has only been about one and a half times round the sun since it was first seen by man. Uranus was discovered by a great German, called William Herschel, who made a living in England by music, but devoted to the study of the heavens every moment he could spare from earning his daily bread. We read his story on another page. Unable to afford a large telescope, this wonderful man made for himself what was then the largest telescope in the world, helped by his scarcely less wonderful sister, Caroline. He discovered Uranus in 1781.

The planet is too far away for us to know whether it spins on itself, and, if so, at what speed. It has four moons, also discovered by Herschel.

Though Uranus in the next sixty years after its discovery had not completed one revolution round the sun, astronomers found that its movements were not strictly in an ellipse.

Knowing the law of gravitation, astronomers were led to suppose that this irregularity in the movement of Uranus must be due to yet another planet, revolving round the sun at a still greater distance. In 1846 that planet was found.

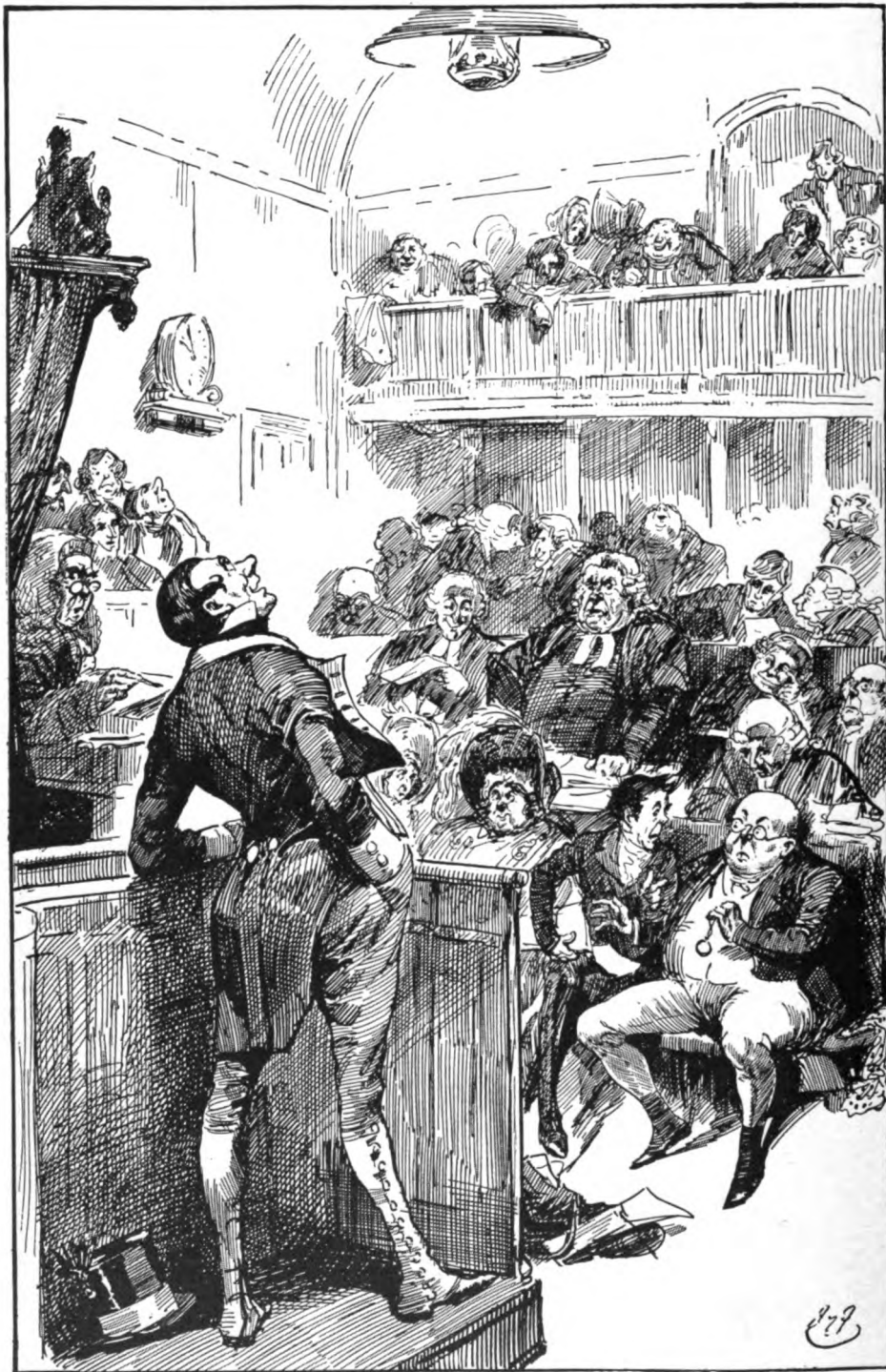
HOW A MAN TURNED HIS TELESCOPE AND FOUND A WORLD NOT SEEN BEFORE

Calculations had been made, and astronomers were directed to look in a certain part of the heavens for the supposed planet that would account for the path of Uranus. They did so, and found it. Probably never in the history of knowledge has there been a more wonderful discovery. It stands to the immortal record of a Frenchman, Le Verrier, and an Englishman named Adams, who independently worked out where the unseen planet must be.

The name of Neptune was given to it, and we believe that it is the outermost member of the solar system. Its average distance from the sun is 2,750,000,000 miles—another 1,000 million miles beyond even Uranus; its year is about 165 of our years, so that it has not yet travelled nearly half of one journey round the sun since its discovery over sixty years ago. We know nothing of its spinning upon itself. It is slightly larger than Uranus, and it has one moon.

The next part of this is on page 2495.

SAM WELLER WILL NOT SEE HIS FATHER



The little judge turned to the witness as soon as his indignation would allow him to speak. "Do you see your father here now?" he asked. "No, I don't, my lord," replied Sam, staring right up into the lantern in the roof.

The Child's Story of FAMOUS BOOKS

A GLANCE THROUGH THE DICKENS NOVELS

AS we did in the case of Sir Walter Scott's *Waverley Novels*, we are now to do with the novels of Charles Dickens. We are to make a hasty run through all these famous books before taking up those about which we are to read at greater length. It is true we have already read three of his famous Christmas books, but these are quite exceptional, and may be regarded as outside the general novels of Dickens. In the case of the *Waverley Novels* we first looked through the whole series in the historical order of the times they described. But with Dickens we cannot do this, as his great novels nearly all describe the life of his own time, and so we shall take them here in the order in which they were written.

THE STORIES OF DICKENS

WE began our readings in Charles Dickens with his famous Christmas books. He wrote a great many short stories in addition to his long novels, but we have so many of the long stories to read that we must pass over these shorter tales even without so much as mentioning their names. Nor shall we read his first book of all here. That is entitled "*Sketches by Boz*," and is a collection of lightly-written articles, meant at first to amuse and entertain newspaper readers, but so full of humour, kindly feeling, sympathy and real character, that they deserved the happier fate which made them into the first published book of one of our greatest authors. "*Boz*" was the name under which Dickens wrote these early sketches.

Nor can we very well tell the whole story of "*The Pickwick Papers*" here. That was the work which made the name of Dickens famous and first brought him in the way of fortune. It is a long, rambling story, loosely but delightfully told, and any short summary of it would be of no value. Samuel Pickwick is the chief character by name—there are ninety-eight characters in the book—though it was not he who made the story so popular. He is the chairman and founder of a club named after him, which is supposed to exist "for the purpose of investigating the source of the Hampstead Ponds," but is really just a comic excuse for Pickwick and his cronies to go about together and have the most amusing adventures you

CONTINUED FROM 2290



could imagine a jolly, good-hearted old gentleman getting into. When "*The Pickwick Papers*" began appearing in monthly parts, the first few issues were not very successful, but as soon as Samuel Weller was introduced, readers everywhere were delighted, and that comical serving man to Mr. Pickwick became at once the most popular character in the stories of that time, as, indeed, he is to this day. We simply can't help liking Sam Weller, though both he and his father Tony are far from being model citizens. Before Sam came into the service of Mr. Pickwick, he was employed at the White Hart Inn in the High Street, Borough, on the south side of London Bridge; and we first see him busy cleaning boots, when a chambermaid calls to him.

"Number twenty-two wants his boots."

"Ask number twenty-two whether he'll have 'em now or wait till he gets 'em," was the reply.

"Come, don't be a fool, Sam!" said the girl coaxingly. "The gentleman wants his boots directly."

"Well, you are a nice young 'ooman for a musical party, you are," said the boot-cleaner. "Look at these here boots—eleven pair o' boots; and one shoe as b'longs to number six, with the wooden leg. The eleven boots is to be called at half-past eight, and the shoe at nine. Who's number twenty-two that's to put all the others out? No, no; reglar rotation, as Jack Ketch said wen he tied the men up. Sorry to keep

you a-waitin', sir, but I'll attend to you directly."

We can tell at once from this that Sam is going to give us much amusement, and he does. Indeed, Sam never speaks without raising a smile, and more often a hearty laugh. His stories are always comical, if they are not always strictly true, as, for instance, his explanation of what the twopenny rope was.

"The twopenny rope, sir," replied Mr. Weller, "is just a cheap lodgin'-house, where the beds is twopence a night."

"What do they call a bed a rope for?" said Mr. Pickwick.

SAM WELLER DESCRIBES A STRANGE SORT OF BED TO MR. PICKWICK

"Bless your innocence, sir, that a'nt it!" replied Sam. "When the lady and gen'l'm'n as keeps the hotel first begun business, they used to make the beds on the floor; but this wouldn't do at no price, 'cos instead o' taking a moderate twopenn'orth o' sleep, the lodgers used to lie there half the day. So now they has two ropes, 'bout six foot apart, and three from the floor, which goes right down the room; and the beds are made of slips of coarse sacking, stretched across 'em."

"Well?" said Mr. Pickwick.

"Well," said Mr. Weller, "the advantage o' the plan's hobvious. At six o'clock every mornin' they lets go the ropes at one end, and down falls all the lodgers. Consequence is, that being thoroughly waked, they get up wery quietly, and walk away!"

SAM WELLER'S FAMOUS APPEARANCE IN THE WITNESS-BOX

We could fill a whole part of THE CHILDREN'S ENCYCLOPÆDIA with stories of Sam Weller alone. He is really the life and soul of "The Pickwick Papers," and those fault-finding people who will tell you he is only a low, vulgar cockney are not to be considered as sound critics. He is a cockney; he is certainly not a gentleman, and he is by no means refined; but he is unfailingly sharp in his remarks, and often extremely witty; and he is certainly a good and useful servant to Mr. Pickwick. It is quite clear that Dickens loved his Weller, and realised that he had found in him the very best way of expressing the native wit of the lower-class Londoner, who at that time was in the habit of confusing the pronunciation of the letters "v"

and "w"; that is to say, Sammy's father called his son "Veller." Sam was a witness in a very funny breach of promise case brought against Mr. Pickwick, and we shall just take a peep at him in the witness-box.

"Call Samuel Weller."

It was quite unnecessary to call Samuel Weller; for Samuel Weller stepped briskly into the box the instant his name was pronounced; and placing his hat on the floor, and his arms on the rail, took a birdseye view of the bar, and a comprehensive survey of the bench, with a remarkably cheerful and lively aspect.

"What's your name, sir?" inquired the judge.

"Sam Weller, my lord," replied that gentleman.

"Do you spell it with a 'V' or a 'W'?" inquired the judge.

"That depends upon the taste and fancy of the speller, my lord," replied Sam. "I never had occasion to spell it more than once or twice in my life, but I spells it with a 'V.'"

Here a voice in the gallery exclaimed aloud: "Quite right, too, Samivel, quite right. Put it down a we, my lord, put it down a we."

WHY SAM WAS QUITE UNABLE TO SEE HIS FATHER IN COURT

"Who is that who dares to address the Court?" said the little judge, looking up. "Usher."

"Yes, my lord."

"Bring that person here instantly."

"Yes, my lord."

But as the usher didn't find the person, he didn't bring him; and, after a great commotion, all the people, who had got up to look for the culprit, sat down again. The little judge turned to the witness as soon as his indignation would allow him to speak, and said:

"Do you know who that was, sir?"

"I rayther suspect it was my father, my lord," replied Sam.

"Do you see him here now?" said the judge.

"No, I don't, my lord," replied Sam, staring right up into the lantern in the roof of the court.

"If you could have pointed him out, I would have committed him instantly," said the judge.

Sam bowed his acknowledgments and turned, with unimpaired cheerfulness of

countenance, towards Serjeant Buzfuz. Above all, Sam Weller is notable for what have been called "Wellerisms" ever since he first appeared in print. We can only explain a Wellerism by giving one example. Being asked to sing, he replied: "Raly, gentlemen, I'm not very much in the habit o' singin' without the instrument; but anythin' for a quiet life, as the man said when he took the sitivation at the lighthouse."

That is a Wellerism, and if it is a somewhat mechanical sort of wit that always uses the same device, "as the man said," and so forth, it is undoubtedly amusing as we find it in the sayings of Mr. Pickwick's famous servant. Into the endless mishaps that attended the career of Mr. Pickwick in his outings with his friends we cannot enter here. But, you may be sure, it is usually Sam Weller that comes to his rescue, as he did once when Mr. Pickwick had fallen asleep in a barrow.

SOME OF THE MANY QUAIN AND CURIOUS FOLK WE MEET IN "PICKWICK"

It was after a picnic lunch, Mr. Pickwick's friends had left the old gentleman alone, and an irate landlord, on whose grounds they had trespassed, caused the barrow and its contents to be wheeled to the village pound, where the beadle kept Mr. Pickwick prisoner, and the urchins tormented him until the faithful Sam appeared, and "damaged" the said beadle in relieving his master. Of the Fat Boy, of Bob Sawyer, the rowdy medical student, of the Rev. Mr. Stiggins, of Sergeant Buzfuz, the brow-beating barrister, of Dodson and Fog, the quaint lawyers, of Jingle, the actor, of Snodgrass, Tupman, and Winkle, his fellow-members of the Pickwick Club, of Mr. Wardle, the old country gentleman who entertained Mr. Pickwick and his friends at his house, of Mrs. Bardell, and ever so many other odd and interesting characters, we could say much; but as it is impossible to give anything like a description of the whole story, we can only pass from it by saying that it is a real old-fashioned English book, dealing, where it is true to life, with manners and customs that have now passed away; full of comic exaggeration, and a source of hearty laughter. It will, indeed, be not altogether to our credit if we cannot be amused by the adventures of Mr. Pickwick.

"The Pickwick Papers" began appearing in 1836, and the author started his next great book, "Oliver Twist," while the other was still unfinished, doing a part of the one and a part of the other time about. Nor had he completed "Oliver Twist" ere he was at work on "Nicholas Nickleby." Of these two books we shall read later on.

TWO LONG STORIES THAT GREW OUT OF A SHORTER ONE

Then, in 1840, he began as a long serial "Master Humphrey's Clock," which was to contain a number of different stories, but after a time developed into "The Old Curiosity Shop" and "Barnaby Rudge." That is to say that "Master Humphrey" was, in a way, the parent of these two far longer and much finer stories, about which we shall read further.

"Martin Chuzzlewit," begun in 1843, we must also read together, and we have already read "A Christmas Carol" and "The Chimes," which came next from his magic pen. "Dombey and Son," published in 1849, and "David Copperfield," begun in monthly parts in the same year, we have yet to read.

In 1852 "Bleak House" began as a serial story. It was a story of that day, and most of the life described in it, even the very places, have now passed away. With what is the main object of that story we need not greatly concern ourselves. In fact, it is neither easy to explain nor to understand. The old Court of Chancery existed to dispose of the fortunes of people who died and left their wealth to relatives not yet twenty-one, and to put right doubtful wills and bequests.

A WARM-HEARTED BOOK THAT HAS A VERY COLD NAME

What happened very often was that the wily lawyers of Chancery swallowed up all the money and took years to settle the cases, with the result that, at the end, the people who had been left the fortunes had grown old and never had the privilege of receiving them. It was an evil system, but is now greatly improved, and perhaps the way Dickens attacked it in this book helped to get it improved.

Although the story has a cold name, "Bleak House" is really one of its author's fire, warm-hearted books, full of quaint and interesting people. It

begins by telling us of the case of Jarndyce and Jarndyce, which had been before the Court of Chancery for so many years that most of the money at stake in the first instance was now in the pockets of the lawyers.

ESTHER SUMMERSON, THE HEROINE WHO TELLS THE TALE OF "BLEAK HOUSE"

It is a woman who is supposed to write the story—Esther Summerson—though sometimes her part stops and the author takes the story in hand himself. Esther tells us that when the woman with whom she lived died rather suddenly, almost her last words spoke of Jarndyce and Jarndyce; so that she began to wonder what this strange case had to do with her. For Esther didn't know her parents and was quite alone in the world. By a mysterious friend she was sent to a school and well cared for, her own gentle and loving nature being, perhaps, the real reason of that; and when she was a young woman the same unknown friend arranged for her to become companion to a young lady, Ada Clare, who was concerned in the Jarndyce case. Ada's cousin, Richard Carstone, was also concerned in the case, and all three met in London on their way to Bleak House in the country. When they all met for the first time, none of them had ever seen their mysterious friend, except for Richard having once had a glimpse of him, he thought.

Their friend turned out to be Mr. John Jarndyce, the master of Bleak House, one of the kindest-hearted old bachelors that ever lived. Esther was at once made mistress of Bleak House, to her intense surprise, and she had to watch over Ada and Richard, for Mr. Jarndyce put the greatest trust in her.

THE GOOD MR. JOHN JARNDYCE AND THE SELFISH HAROLD SKIMPOLE

Bleak House was a really fine mansion, and only one of its inmates had a selfish heart. That was Harold Skimpole, a charming old gentleman, whom Mr. Jarndyce had befriended, and who seemed the very picture of every goodness, but was at heart a selfish, lazy old fellow; a sponger, in short. Their life at Bleak House was happy and full of interest at first; Richard was clearly falling in love with Ada, and Esther loved Ada sincerely. But many troubles were in

store for all. Richard was not always wise in what he did; the Jarndyce case dragged on and kept all in terrible suspense, for it involved the fortunes of both Richard and Ada.

We cannot follow the story, however, except to say that in the end, when poor Richard had married Ada and the case was at last concluded, their fortunes had vanished, and, Richard being stricken with consumption, the turf had been laid upon his grave ere his little son was born. Esther also discovered the secret of her parentage, but best of all was her marriage with Dr. Allan Woodcourt, the great-hearted surgeon who strove so nobly to save Richard's life. Their new home they also named Bleak House, and though John Jarndyce lived on at the old house of that name and watched over Ada, the two Bleak Houses were in constant communication.

THE LESSON DICKENS TEACHES IN THE STORY CALLED "HARD TIMES"

"Hard Times," which began to appear in 1854, was the next novel by Dickens. It is also a "story with a purpose." Although John Ruskin, the famous art critic, thought it in some respects the greatest work of Dickens, that is not the general opinion.

There is a Thomas Gradgrind, who is a great believer in statistics; he thinks that you can tell exactly the happiness and misery of a place by finding out how many births and deaths, and how much wages the people earn, what the rents of the houses are, and all that sort of thing. But he is a good-hearted man, for all his faith in these dry, deluding figures. He persuades his daughter Louisa to marry Josiah Bounderby, banker and cotton master, who is much older than she is, and by no means a lovable person. But her brother Tom is in Bounderby's office, and she wants to please her father and to help Tom.

Of course, such a marriage could not turn out happily, and as Tom steals money and runs away, matters are worse than ever. Mr. Gradgrind lives to understand that it is not wise to trust to mere statistics, and to realise that human hearts and their feelings cannot be reckoned like sums in arithmetic. When Bounderby dies, Louisa is able to marry according to her own choice, and she is happy in the end.

In "Little Dorrit," which Dickens wrote a year after "Hard Times," we have a contrast between poverty and riches. The first part of the story is all about the unpleasant associations of the Debtors' Prison, in which some members of the Dorrit family had to pass some years of their life. With the exception of Amy, who is known as Little Dorrit, and Frederick, her father's brother, who has to play the clarionet for a living, all the Dorrits are a pitiable lot in the days of their debt and poverty, and it is only natural that when they come into money they should prove to be as contemptible in their pride as they were pitiable in their poverty. Little Dorrit, however, is unchanged through all her trials, and is ever sweet and affectionate. She marries a worthy young man named Arthur Clennam, and leaves us with a future of assured happiness in store, none deserving that better than Amy.

THE ROMANCE OF THE FRENCH REVOLUTION CALLED "A TALE OF TWO CITIES"

Next from the busy pen of the great novelist came his fine romance of the French Revolution, called "A Tale of Two Cities." The two cities are London and Paris, and the state of life in them during the awful years of the Revolution is very vividly described. The story is quite unlike all the other novels by the same author. For they all rely for interest upon the characters described in them, rather than upon the thrilling events which take place.

It is the opposite with "A Tale of Two Cities." The real hero of the story is Sydney Carton, a true gentleman at heart, who has, unfortunately, taken to foolish ways of life, and ruined all his chances of worldly success. Dr. Manette, a French gentleman who has been imprisoned in the Bastille of Paris for eighteen years, is at length liberated and restored to his daughter Lucie, who marries one called Charles Darnay, son of the Marquis St. Evrémonte, and a refugee in London.

For Lucie, Sydney Carton has a strong and self-sacrificing love, and her marriage, of course, makes everything hopeless to him. But Darnay, at great risk, goes to Paris to try to help a friend in distress; Lucie and Dr. Manette go there also, and Sydney Carton as well. In the awful days of the Terror, when many innocent people were beheaded

every day without a proper trial, and on the mere word of any informer, Darnay is arrested. But, by managing to take his place in the prison, Sydney Carton saves the life of Lucie's husband, and allows himself to be executed instead.

THE LAST WORDS OF SYDNEY CARTON AND THE STORY OF "PIP"

It is really a great story of self-sacrifice, and the last words of Sydney Carton before he is executed are: "It is a far, far better thing I do than I have ever done; it is a far, far better rest I go to than I have ever known."

In 1860, "Great Expectations" began to come out in monthly instalments. This is one of the novels in which the hero is made to tell his own story, and a most interesting story it is. He is known as Pip, the nephew of a village blacksmith, who brings him up. He is a poor lad, who dreams of one day being a "gentleman," a dream that seems most unlikely ever to come true. When he is about seven he meets an escaped convict in the village churchyard, and is frightened by the man, whose name is Magwitch, into bringing him a file to remove his fetters and some food to eat. The convict escapes to New South Wales.

Pip, meanwhile, becomes the playmate of little Estella, the adopted child of Miss Havisham, who is the daughter of a rich brewer. Miss Havisham has been disappointed in love, and has a hatred of men, so that she is teaching the beautiful Estella to break men's hearts when she grows into a fascinating woman, and Pip is to be her first victim.

HOW PIP'S "GREAT EXPECTATIONS" WERE NOT ALL REALISED

Later on, Pip is bound apprentice to his uncle; but when he has served only half his time, he is told that some mysterious benefactor has provided for his education, and that he may now regard himself as a young gentleman with "great expectations." It looks as if the dream were to come true, after all. His friend was none other than Magwitch, now a rich farmer, and when Pip was twenty-three the ex-convict came back secretly to England to see him and give him a fortune. But Magwitch was recognised and arrested, being condemned to death at Newgate, and his whole fortune confiscated, so that Pip was penniless after all, and had to become a clerk. Still, he had another "great

expectation": to marry Estella, his former playmate, who was really the child of Magwitch, and who was to inherit Miss Havisham's riches. However, she married a man who used her very badly, squandered her fortune, and left her in most unhappy circumstances when he died. Pip was now a partner in his firm, and he still loved Estella, so that perhaps he married her after all; but the story ends without telling us, and leaves that to be guessed, though there is little doubt of it, as Estella had always really loved Pip, and only her old pride led her away from him at first. Neither had any false pride left, so that they could look to a happy future.

"OUR MUTUAL FRIEND" THE LAST GREAT NOVEL OF CHARLES DICKENS

The last great novel which Dickens finished before his death was "Our Mutual Friend," one of his heartiest and most delightful stories. John Harmon is the "mutual friend," meaning that he is the friend of the Boffins as well as the Wilfers, but the word "mutual" is wrongly used, as "common friend" would be correct in such a case. The son of a hard-hearted old contractor, who turns him out of doors for protesting against the way his sister had been treated, John goes abroad by the help of Boffin, who worked for old Harmon, and is supposed after a good many years to be dead. But he returns to England to find that his father has died, leaving his fortune of \$500,000 to him, on condition that he marries Bella Wilfer, and, if he does not, that the money shall go to the Boffins. John greatly dislikes the idea of having to marry one he has never seen, and decides to conceal his real name for a time, calling himself John Rokesmith, under which name he takes service with Mr. Boffin, who recognises him, but does not let John know his secret is guessed.

MR. BOFFIN'S CLEVER LITTLE PLOT TO TEST THE LOVE OF JOHN AND BELLA

Boffin contrives, however, for Bella and John to meet, and John falls in love with her sure enough. Then, in order to test Bella's love, Boffin pretends to be angry with John for aspiring to marry her, and becomes unfriendly to him, so that if she does marry him she will think she is marrying a poor man, and losing the fortune provided by old Harmon's will should John Harmon

turn up and be willing to marry her. But Bella loves John for his own sake, and does not hesitate to marry him and to live with him on his small earnings. After their first child is born, however, good Mr. Boffin puts all right, and John has the joy of taking his wife to a beautiful house where, now possessing his own fortune, John Harmon and his wife live in happiness and luxury with their dear old friends, Mr. and Mrs. Boffin.

Of course, this is a very bare outline of the story, and we must all read the book for ourselves. It contains a number of characters who are as well known as though they had really lived—better known, in fact, as they live for ever in the pages of Dickens and in the memory of his readers. All his books are rich in this way, and there are few of them that do not give us some figure of a man or woman we shall never forget. In "Our Mutual Friend," for instance, apart from the principal persons already named, there are Mr. and Mrs. Podsnap, both pompous, self-satisfied persons, who think they are in "society" and very superior to ordinary people. Hence we call persons of that class "Podsnaps."

SILAS WEGG, WITH THE WOODEN LEG, AND JENNY WREN, THE DOLLS' DRESSMAKER

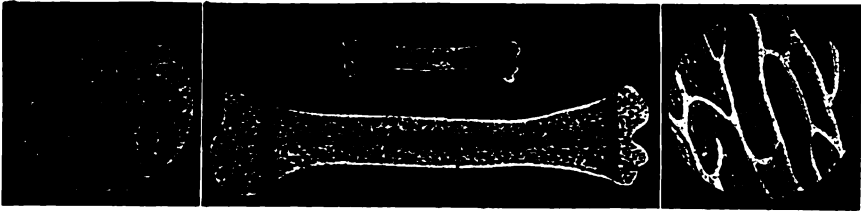
Then there is Silas Wegg, with the wooden leg, who kept a fruit-stall and wrote poetry like this:

Beside that cottage door, Mr. Boffin,
A girl was on her knees;
She held aloft a snowy scarf, sir,
Which (my eldest brother noticed)
Fluttered in the breeze.

But young folk will be most interested, perhaps, in Jenny Wren, the dolls' dressmaker, who is certainly one of the best characters in the whole story.

Of "Edwin Drood," the last work on which Charles Dickens was engaged at the time of his death, in 1870, it need only be said that this is an unfinished story of a mystery, and though many efforts have been made to complete it by other writers, none seem to have been quite successful, and the book remains, like one of those broken columns we see in graveyards, to remind us that death overtook the great author, whose magic pen had given so much entertainment to his own and later generations, while he was still at the height of his power and inventive genius.

The next stories of Famous Books are on 2551.



A growing bone is different from a grown-up bone. The picture on the right shows the canals and the red blood-cells of a grown-up bone. On the left are the growth-cells of a growing bone. The dark part on the small middle picture shows the growth-power of a child's bone, which disappears as the bone grows larger.

HOW YOUR BODY IS BUILT UP

WHEN the bodies of animals began to develop into more beautiful and complicated forms, when they became larger and able to do a greater variety of things, it was necessary that the body should produce in itself some hard parts which would serve like a scaffolding to hold the body together and for the muscles to pull upon. When we see great buildings made nowadays, by first of all putting up skeletons of iron or steel, as shown on page 623, we can get an idea of one of the many uses of these hard parts of the body. Perhaps the very first use that hardness was put to in the body was protection, as we see to-day in the shell of the snail and the oyster; and we shall soon learn that some of our own bones exist mainly for this purpose.

We may call the hard part of an animal its *skeleton*, and if we compare such an animal as a lobster with such a fish as a herring we shall learn the first interesting thing about skeletons. It is that an animal may have its skeleton outside its body or inside its body. The lobster's skeleton is outside its body, and its muscles are inside its skeleton. In the case of the herring it is the other way round. The older kind of skeleton is the lobster's kind, and when we study all the forms of animal life we learn how to trace the beginnings of the newer kind of skeleton which has the rest of the body outside it, and which we see in

CONTINUED FROM 2348



the fish or in ourselves. All the animals that have their skeleton on this pattern inside their bodies are called *vertebrates*, from the name, *vertebræ*, of the little bones that are piled against each other to form the backbone.

So, instead of vertebrates, we may say back-boned animals, and that comes to the same thing.

The animals that have no backbone at all are called *invertebrates*, a large word that means simply "not back-boned," and many of these are quite familiar to us and have already been described in this book. For instance, oysters, jelly-fish, snails, moths, butterflies, and sponges, are examples of invertebrate creatures.

By far the most important and wonderful animals in the world are the back-boned animals, and our own bodies belong to this great class. We find that we can arrange the back-boned animals into a few great groups, and the real way to understand our own skeleton and bones is to study the development of the skeleton from the simple back-boned animals upwards.

The lowest kinds of back-boned animals are the fishes, and although the first fishes were very humble and simple compared with even a herring, a herring will do quite well for our present purpose. When we open a herring at breakfast, we see that its head is placed at the end of a great column of small bones. This column is its backbone, and the small bones are its *vertebræ*. It would be easy

to spend many pages in discussing how the skull comes to be formed at the end of the backbone, but we have no room here for that great question. At any rate, the skull contains the brain, and the brain runs down from the head through the backbone, or spine, in the form of a long cord of nervous matter, which is called the spinal cord. The great business of the bones of the head is to protect the brain.

THE WONDERFUL DEVELOPMENT OF THE FISH'S FIN IN HIGHER FORMS OF LIFE

That is true in the case of the herring, and it is true in the case of ourselves. We could scarcely get through a week if we had not the skull to protect the brain. And so now we can learn at once that, even in the vertebrate animals, the most important part of the body is still inside the skeleton and not outside it.

But if we consider the herring further, we find something lacking in him which we know very well in the case of the frog or the horse or ourselves, and that is limbs. We must go to the next group of vertebrates, called the *amphibia*, to find these. Any frog will soon teach us what limbs are. The history of them is that they were developed from long side fins which the fishes invented. Now, when we look at the skeleton of a frog, we see at once that it consists of two parts. One is the part which lies along the length, or the *axis*, of the frog, and this is usually called the *axial* skeleton. It is different in some ways from what we saw in the herring, but it is really the same thing as the herring's skeleton, although, in addition, the frog has four sets of bones projecting sideways and outwards from the axis of its body, which are its four limbs.

THE MARVELLOUS UNITY IN ALL KINDS OF CREATURES FROM A FROG TO A MAN

There is no exception to the rule that of all the thousands of kinds of vertebrate animals above the fishes, from the frog up to man himself, every one, without exception, has four limbs, never more and never less, at some stage in its history. This is true of the whale and the seal, and it is even true of the snake, though in these and some other animals one or both pairs of limbs may have become so small that they do not show when the animal is grown up. It is one of the most interesting things in

the world to find this wonderful unity of plan, showing itself without exception onwards from the remote time when the side fins of the fish first yielded to the four limbs of such a creature as the frog. No matter whether the creature is a crawling snake or a bright lizard running quickly in the sun, or a whale swimming in the water, or a bird flying in the air, or a dog or a man, the rule is that its skeleton is formed on the principle of a backbone made up of little pieces, but stretched and hollowed out at the front end to hold the brain; and of two pairs of limbs, one in front and one behind.

Another thing we notice about the skeleton of all these creatures—a thing which greatly adds to their grace and beauty—is that it has two sides which are perfectly like each other. This character about a thing is called *symmetry*, which simply means with-measuring. You can measure one arm against the other, and so on.

A MIRACLE THAT WE ALL DO EVERY DAY OF OUR LIVES

This two-sided symmetry is part of the plan of the body, and it applies not only to the skeleton upon which the body is built, but also to everything. It is not always quite exact, for we find that two sides of the same face are not exactly the same; that the two arms are not exactly the same length. But still, this two-sided symmetry of the body is a thing we can all see, and it is based upon the two-sided symmetry of the skeleton.

Now, we compared the skeleton with the steel framework of, shall we say, some big modern hotel, and it is our framework; but it is much more, and before we go on to look at it more closely we should know what all its uses are.

This framework is not the framework of a thing that is to stand still, but of a thing which is to move. A tree has a harder part which is, in a sense, its skeleton; but a tree is a plant, and the rule about plants is that, as they can feed on air and light and earth, they can stay where they grow. But an animal's food is of very special kinds, which are not to be found everywhere, and as its food will not come to it, it must go in search of its food. Therefore, one of the great marks of an animal is that it moves

about. Its framework, then, has to be of a very special kind, for the animal moves not because it is blown or pushed from without, but because it is able to bend certain parts of its body upon other parts of its body. We may never have thought about it, but the mere taking of a single step is a miracle, and the men who have spent twenty years in studying nothing else than that know that the more we study it the more miraculous it is. But all human beings are like that; they go wandering away to find wonderful things, though, wherever they may happen to be, there is infinite wonder under their very noses.

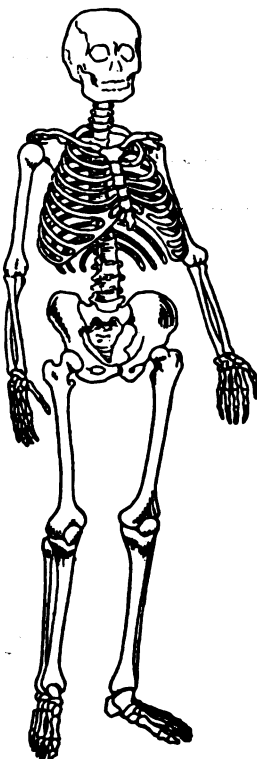
It is plain, then, that it will not do to have a skeleton made all in a piece or made of pieces that are buckled firmly together like the framework of a house or a ship. So, wherever movement is going to be required, we find the skeleton made of separate pieces with joints between them. We have never thought much about joints, perhaps, but engineers have to make joints whenever they build a motor-car or a steam-engine; and they have to keep those joints working smoothly if they can, but no engineer ever made a joint one-thousandth part as wonderful and perfect and durable as any of the scores of joints in our body. Now, the bones have no power of movement in themselves. If they are to move, something must pull them. The things which pull them are the muscles, and the rule about a muscle is that it runs from one bone to another *across a joint*. When the muscle shortens, it bends the one bone on the other at that joint.

Plainly, then, the skeleton is very much more than a framework for the body, but we have not discovered all its duties yet. The skull and the back-bone are not merely supporting, but protective. Within them there lies

the precious nervous substance which guides and directs the whole of the body. Lastly, as if they had not enough to do, very many of the bones contain, inside them, the millions of cells which are ceaselessly engaged in turning out new red cells for the blood. Sometimes the red cells of the blood are destroyed too quickly, and have to be made more quickly than they ought to be. Then we find that the various bones, such as, say, the shin-bone, which we may have thought

of as if it were a mere supporting rod for the leg, get filled more and more with the living cells which make red cells for the blood—so much so, that if the need for an extra supply of red cells continues, the bony part of the bone will almost disappear, and it may become apt to break. It is well for us to know this, because we are so apt to think of our skeleton as if it were something lifeless inside us, and nothing could be farther from the truth.

If we go back to the fishes again for a moment, we shall learn that the bones begin in the shape of something which is not really bony, but gristly. The proper name for gristle is cartilage, and most of our bones are made of cartilage to begin with. Then, by a wonderful process, true hard bone is laid down inside the cartilage



The skeleton is the framework of the body, and is made up of more than 200 separate bones.

in a fashion so wonderful that, compared with it, the building of a breakwater under the sea is easy. The bones of small children are not completely bony; they are more gristly really, and sometimes, in a case where the bone of a grown-up person would have broken, the bone of a child simply bends instead of really cracking, just as the green branch of a tree will bend instead of snapping. So this kind of fracture is called a "green-stick fracture." If we think for a moment, we shall see that no little boy or girl could grow up if his or her bones were like those of grown-up

people, only smaller. If a little boy's bones were finished things, there would be no possible way of enlarging them to perhaps three times the length that they were, and two or three times the thickness. Thus, a growing bone is vastly different from a grown-up bone. The inside of a grown-up bone is busy, making red blood-cells, but the outside and the ends of it are doing nothing. The bone is made, and there it is. On the other hand, the outside and the ends of a child's bone are as busy and active as any other part of his body, for they are building.

THE TINY SPECKS THAT WORK FOR US AND BUILD UP OUR BODIES

Perhaps some day you may have a chance of seeing for yourself through the microscope the wonderful way in which the bones are built—some cells laying down new bone; other cells coming along and scooping it out just where it ought to be scooped out, and so on. But I tell you here that the mind of the wisest and soberest man may almost reel at such a sight—when he asks himself how and by what knowledge these tiny specks of living matter do, each of them, its tiny work

in the dark for the good of the body, as to the very existence of which it cannot have the smallest notion. Perhaps the people who say that human life is not worth while, and ask what is the good of us all scurrying backwards and forwards, living and dying, and soon being forgotten, may learn from the building of a bone that men and women are engaged in making something just as much beyond their imagining as a man's body and life and thoughts and deeds are beyond the imagining of the tiny cells that built his bones.

It takes years to know the skeleton thoroughly, to understand the use of every little part of every bone; to be able to recognise even a small piece of any bone when we see it; to know whether it is a human bone or the bone of an animal, and to know which side of the body it comes from. Knowledge of that kind is necessary only for the doctor. Here, however, we can learn some of the great facts about the skeleton, especially with the help of

some pictures. Pictures of bones are, perhaps, not beautiful, but that is because we do not look at them in the right way. The bones are absolutely necessary to our life; they are most exquisitely made for their purpose, and the way in which they are made is a perpetual miracle. So there is beauty enough even in bones if we could see it.

Let us begin with the axial skeleton, which, as we have seen, is the oldest part of the skeleton; and with the oldest part of it, which is the backbone. This is made up, we know, of several quite small pieces, resting upon each other, and that fact has two interesting meanings. One is that all creatures which have backbones are descended in the remote past from a creature whose body was made up of many pieces very like each other, joined together—such, for instance, as a worm. Even the human body has very many traces in its structure of this descent from a creature whose body was made from pieces called segments. Now, just as the segmented structure of the worm



Bones of a finger joined by the ligaments, or the things that bind the joints.

greatly helps its movement, so in practically every one of our movements we benefit by the fact that our backbones are made up of little pieces. If the backbone were really a single bone, our lives would scarcely be possible. Even when we move our arms only, we alter the balance of the body, and it is necessary that the curve of the backbone shall be slightly altered. One of the uses of exercise, and especially of play and games for children, is that they make the growing backbone supple, and help us to get control of it, so that we are not clumsy when we grow up.

HOW IT IS THAT WE CAN STAND ERECT WITHOUT FALLING

The different vertebræ that make up the backbone differ very much in size and shape. Those in the neck, for instance, are very much smaller than the large ones in the small of the back, which have a great weight to carry; those between the two are different again, because they have attached to them the ribs—the long, curved, slender bones which help to make the wall of the chest. We find that in all sorts of animals, as well as ourselves, the shapes and even the number of the different vertebræ

correspond wonderfully. For instance, there are seven vertebræ in the neck of practically every mammalian animal, as there are in ourselves. The giraffe, with its very long neck, has seven vertebræ, just as you and I have, and just as the whale has, though it seems scarcely to have a neck at all.

There are two great differences between the backbone of man and the backbones of other animals. One is that the backbone of man is very much shorter. In most animals the backbone runs right down into the tail, and there are vertebræ in the tail, as there are anywhere else. But the tail of man is only represented by four tiny vertebræ, which have got squeezed together into a single small bone, and which are of no use, and perhaps are even getting smaller still in mankind.

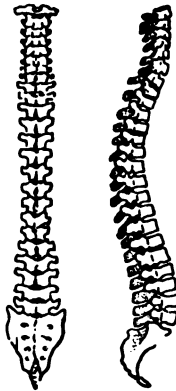
The other great difference is vastly more important, though you might think that nothing could be more important than the almost complete absence of a tail. It is the way in which the backbone of man is curved. There is a great difference between the curve of a baby's backbone and that of a grown-up person. In the baby and four-footed animals, and even in the half-erect monkeys, the backbone is so curved that the weight of the body is bound to fall forwards unless a very special, and, after a time, a very tiring, effort is made. A dog can be made to walk on its hind legs, but this is not natural to the dog, and needs a special effort. But the curve of the backbone in ourselves after we have passed the first baby stage is quite different; and, as the body is built upon and round the backbone, the result is that in ourselves, and in ourselves only, the weight of the whole upper part of the body tends to roll not forwards, but backwards. On the front of our hip-joints we have two

great straps of strong fibres, called ligaments, which prevent our heads and trunks from rolling backwards when we stand up. Other creatures have these bands of fibres, but in them they are tiny, while in us they are the biggest and largest in the whole body. It is because our backbones are curved as they are, and because we have these bands of fibres in front of our hip-joints, that we can stand erect with scarcely any effort at all. This means that we can use our arms not for mere walking or standing, but for all the many things, like writing and sewing, which help to make us human.

If we look at a single vertebra—not taking any one in particular, but taking an average vertebra, or, as we say in science, a typical vertebra, something corresponding to our general notion of what a vertebra is—then we find that it is a very irregular, and yet a very regular, piece of bone. It has a solid piece called the body, and these bodies are piled upon each other like a pile of coins, and so make the spinal column, or backbone. Opposite the body there is a point projecting, and we can readily see or feel the long row of these points in ourselves or other people, running down the middle of the back. These points, and the others at the side of the vertebra, have muscles and strong cords of fibres attached to them. The vertebræ are so beautifully and perfectly bound together in this way that it is practically impossible for any accident to disjoin or dislocate any part of it unless it is broken as well.

But the other great feature of the vertebra that we notice is the large hole in the middle of it. When the vertebræ are all put together to make the backbone, these holes go together to make a long tube,

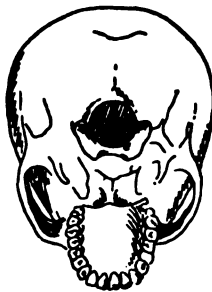
which opens at the topmost vertebra, and runs right down almost to the end of the backbone. Lastly, if we



These pictures show the backbone as seen from behind and from the side. Below are views of a single bone.



The lower picture shows the hole through which the spinal cord passes down the backbone from the brain in the skull shown below.



This picture shows the hole at the base of the skull where the backbone fits. Through this hole, down a tube in the backbone, the brain sends messages all over the body.

see a number of the vertebræ put together, we shall find that even though they are so beautifully and tightly jointed, yet between every two vertebræ on each side there is a hole.

HOW ALL OUR THOUGHTS AND FEELINGS ARE CARRIED THROUGH A TUBE

Now, the tube made by all the vertebræ put together holds the spinal cord, without which we cannot move or feel or live; and the little holes at the sides, between every two vertebræ, carry the great spinal nerves which leave the spinal cord, and then are distributed to every part of the body, even to the skin of the smallest toe—as you will know if you have a corn; and these nerves carry from the spinal cord all the orders to the muscles, and to the spinal cord all the feelings from the skin, and so on.

Now, it is plain to us at once that there must be some great hole in the skull which, so to speak, lets the spinal cord through from the skull into the spinal column; and that is so. When we look at the skull as it is balanced upon the backbone, the most noticeable thing at the base of it is a large hole, and on each side of it there is a very smooth little place. These smooth places fit on to corresponding smooth places on the top vertebra, and every time we move our head the skull rocks on the top vertebra at these two places. The hole between them exactly corresponds to the large hole in the top vertebra—which is, indeed, scarcely more than just a ring of bone—and it is here that the lowest part of the brain is continued into and becomes the spinal cord. It is the brain that feels, and the brain that wills, and every message from our body and limbs to the brain travels along the nerves to the spinal cord, and then through this great hole at the base of the skull up into the brain. Every message from the brain passes out through the spinal cord to the nerves and then to the limbs.

HOW THE SPINAL CORD FLOATS IN THE TUBE AND IS PROTECTED

The spinal cord is wonderfully protected by the backbone. Inside the backbone it lies enclosed in a sheath or coat filled with fluid, in which it floats. Thus a blow upon the backbone—unless it is a very hard one—and the movements of the backbone, do no harm to the spinal cord; it does not feel

them, for the water-bed in which it floats protects it. Also, the backbone, and all the muscles round it, protect the spinal cord very perfectly from the sun. The one place where it is not quite so well protected as anywhere else is the back of the neck, and in people who are not very much accustomed to the hot sun, this is the place where they need to protect themselves from what we call sunstroke. If we allowed our hair to grow long, and if we all had it hanging over the back of the neck as a young girl has, then even this one place would be protected, too. But, as it is, there is very good sense in putting a handkerchief, or something of the kind, over the back of the neck in very hot weather, and so protecting the one place where the central part of the great nervous system is rather more exposed than anywhere else. But remember that even here Nature has provided a protection in the form of the hair, which helps very greatly to protect the brain itself from sunstroke.

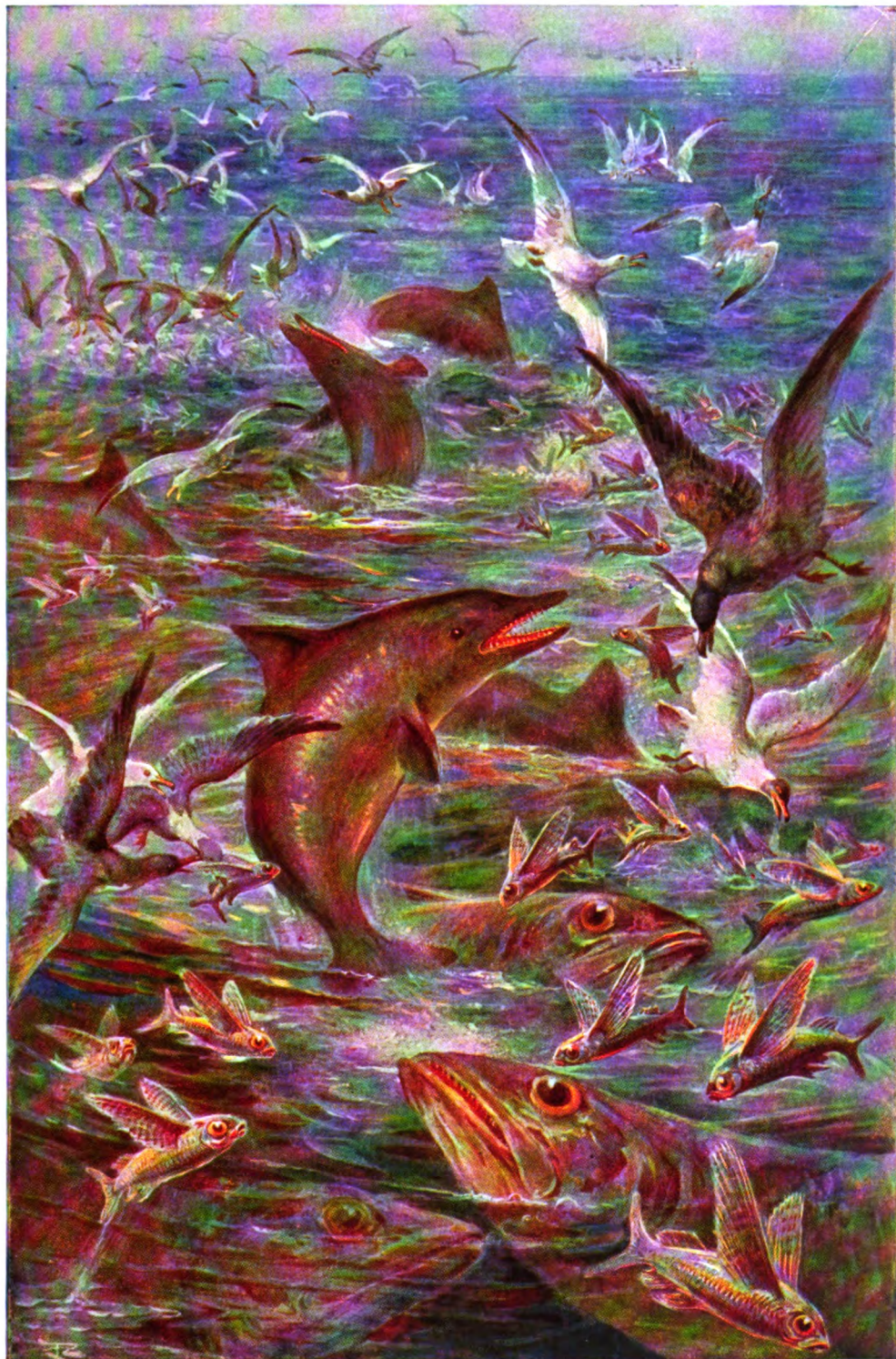
THE BACKBONE ROUND WHICH OUR BODIES ARE BUILT

At its lower end the spinal column is jointed to the great hip-bones, from which the bones of the leg spring. At this part of the spinal column we find five vertebræ jointed together into one bone. Long ago it was supposed that the soul lived in this bone, and it is still known as the sacrum, or sacred bone.

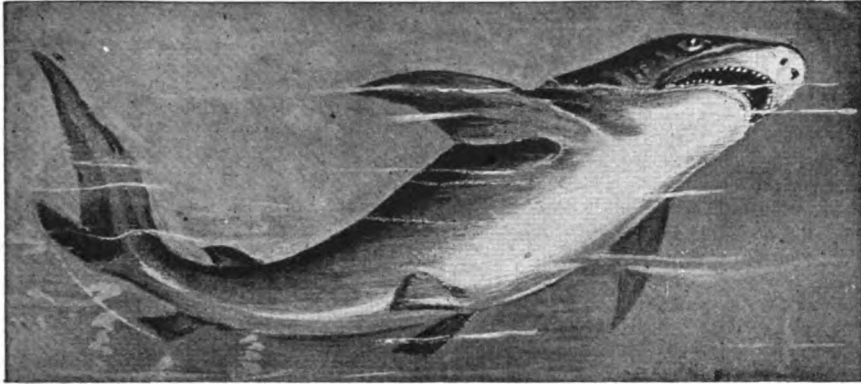
Higher up, below the neck vertebræ, and above those that make the small of the back, is the row of twelve vertebræ from which the ribs spring—twelve on each side. The number is the same in men and women; not one less in men, as some people imagine. Most of the ribs in front are joined on to the breast-bone, which you can feel in yourself very easily, and this bony case contains the chest inside it; while outside it are placed the collar-bone and the shoulder-blade, from which spring the bones of the arms. If now we just remind ourselves that the skull is balanced on the top of the backbone, we shall see how much good sense there is in such a saying as that good homes are the *backbone* of any nation. It is round and upon the backbone that everything is built, and without it everything else would go to ruin.

The next part of this is on page 2541.

THE FLYING FISH'S BATTLE FOR LIFE



The flying fish has anything but a happy time. In the sea it is preyed upon by the tunnies and dolphins, and when, as shown in the picture, it seeks to escape from its watery foes by flying in the air, gulls swoop down upon it.

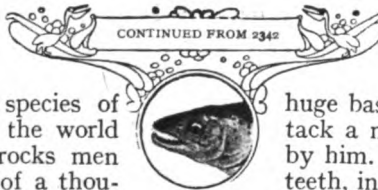


The shark is one of the creatures most feared by men. With one snap of its jaws it can bite a man in halves. The terror of shipwrecked sailors, it is dreaded by all bathers in warm seas and tidal rivers.

BIG FISH OF SEA AND RIVER

Now that we come to the fishes proper we have a very big subject. There are fully 9,000 different species of fish in the waters of the world to-day, and in the rocks men have found remains of a thousand more species of fishes that once lived, but have left no descendants like them. If we took the scientific order of classifying fish it would be terribly dull work. All the scientific words are difficult for us to remember, and unnecessary to use at this stage of our study, so we must just get to know a little more about the fishes themselves, and leave all the technical matter about their scientific classification to later and more serious reading and study.

Naturally, in thinking of the big fishes of the sea our thoughts go first to the sharks. A big hungry shark is the last thing that we should desire to meet in the water. With their frightful teeth they can bite a man in two. Yet even death in that form might be less terrible than by the methods employed by the horrible saw-fish. That cruel wretch really ought to come into this chapter, but we have already seen, on page 1086, what a ferocious creature he is, as well as that other rogue, the sword-fish, and what terrible enemies they are to the mighty whale, so we need add nothing here.



The sharks, big and little, are quite bad enough for one story. Some of them, like the huge basking shark, will not attack a man unless first attacked by him. These have only small teeth, in spite of their enormous

bodies, and lie lazily on the top of the water, content with small fishes that swim in shoals, and even tinier things with no backbone. The basking shark grows to a length of more than thirty feet, and has a huge mouth to enable it, like the baleen whale, to take in a great quantity of food at one gulp. Men hunt it for the sake of its oil, of which a large shark yields from a ton to a ton and a half.

The shark of which we have most reason to be afraid is the white shark. The members of this species reach a size which is exceeded only by that of the great whales. One has been preserved which measured 37 feet, but that is by no means the largest of which there is record. Still, that is big enough to do frightful harm to men. These sharks have terrible teeth, set in rows, one row behind another. As the teeth wear out, or become dislodged, they are replaced by others, as in the case of the snake. The sharks have this feature, too, in common with the snake, that they do not propel themselves through the water by means of the tail, as the majority of fish do.

Like the eels, they make their way by a wriggling of the whole body, and their great fins serve as balance, as in the case of the rest of the fish family.

The mouth of the shark, as we all know, is placed underneath its body, so that to grasp its prey it has to turn over on its side. This is the one chance which a man in the water has against these monsters. If he has a knife and can swim, he may save himself by diving as the great fish turns, and by stabbing it with his knife. But not every man has the power and the nerve for such a feat.

Very determined creatures are the big sharks; they will follow a sailing-ship for weeks, showing a wonderful power of muscle. Many sailors have a superstition that when a shark follows a vessel it is a sign that somebody on board is going to die. Of course that is all nonsense. Sharks follow vessels because experience has taught them that all manner of garbage, good enough to make a shark a meal, is thrown overboard. If by some dreadful misfortune a man should fall overboard, then woe betide him. The shark will have him, or will, at any rate, snap off one of his limbs.

SHARKS THAT FOLLOW THE HERRINGS INTO THE FISHERMEN'S NETS

We do not often see white sharks off our coasts, a fact for which we have reason to be thankful. But their relatives, blue sharks, visit us. They come after the herring, mackerel, pilchards, and other fish, and follow them into the nets. They have no fear of the nets spread to catch smaller fish. With their sharp teeth they can bite the nets to pieces, while, if there be bait on a line, they cut the line through as easily as if it were made of cotton. They make sad havoc with the fishermen's nets and lines. Sometimes they are caught. Then some fishermen, if there are many visitors staying in the town, put their enemy on a cart, wheel him through the streets, tell the story of his capture and the damage he has done, and collect enough money to make good the evil he has wrought. In warmer seas than ours the blue shark reaches a length of 20 feet and even more in some cases, and will attack a man as readily as will a white shark.

Another enemy of the fishermen is the fox, or thresher, shark, which has a singularly long tail, of which the upper lobe grows to such a size as to suggest the first name it bears. The second name, that of thresher shark, is suggested by its habit. It swims round and round a shoal of herring or mackerel, and by threshing or beating its big tail on the water frightens them all into a mass, where it can dash in and eat as many as it wants. Nineteen big mackerel and two herrings were taken from the stomach of one of these sharks which was caught.

AN ENEMY OF THE WHALE, AND THE SHARK WITH THE HAMMER-HEAD

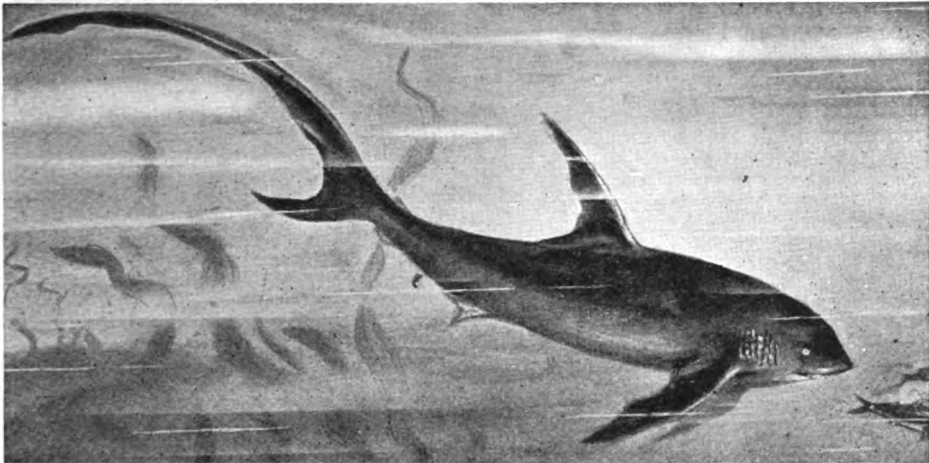
Another of the hungry sharks is the Greenland shark, which reaches a length of 15 feet, and sadly persecutes the whale. With its powerful teeth it can bite huge lumps out of its larger neighbour's tail; and it is so eager to gorge itself with food that it will allow men to approach and spear it while feeding on the body of a dead whale. Perhaps the strangest of all the family is the hammer-headed shark. This has a remarkable head, as its name implies. The front portion of the head grows out into two broad lobes, the eyes being placed at the ends of the two lobes. What purpose this formation serves nobody knows. The mouth is underneath in the usual position, and the brute is as much dreaded by men as the rest of the genus.

To discuss all the sharks would be to fill this book. Some in the Indo-Pacific are said to attain a length of 70 feet; others are like great savage conger-eels; others are remarkable for the formation of their jaws, which have the teeth arranged like spiky pavements.

GIANT TEETH THAT TELL US OF SHARKS OF BYGONE DAYS

Between the coasts of Australia and Japan sharks hide in waiting for their prey, clad in skin which looks like rock covered with short vegetation and coral. Many species of sharks have died out, and we are able to trace them only by their teeth. Their bones, as we should call them, disappear. The framework of the sharks is not really bone; it is tough, fibrous cartilage, which in course of time disappears from the skeleton, leaving only the teeth to tell us where the sharks were. Great

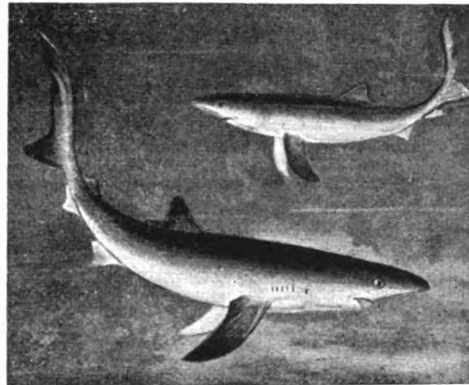
SHARKS, THE WOLVES OF THE SEA



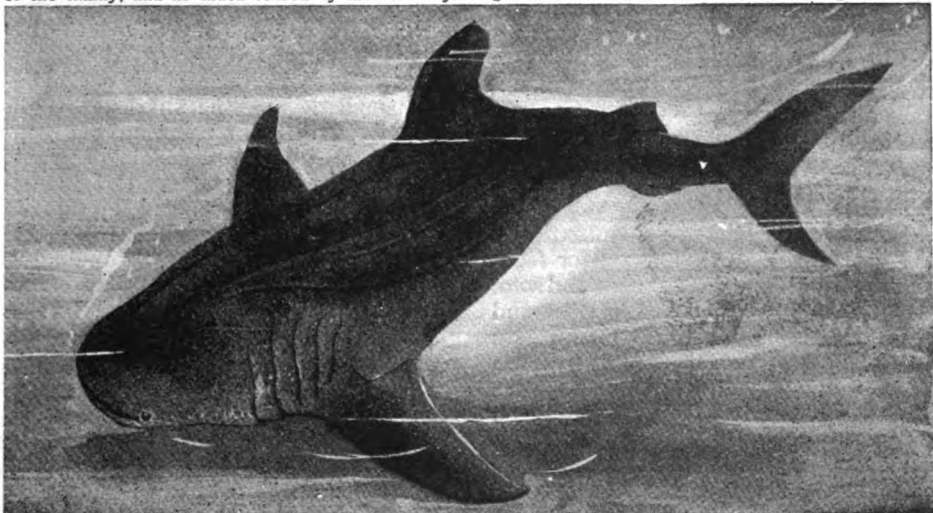
The fox shark, so called from his long fox-like tail, is also called the thresher shark. The latter title describes his methods. Swimming round a shoal of herrings or mackerel, he "threshes" the water with his big tail, frightening the fish close together. Then he darts in and has a very fine meal, gobbling up as many as he wants.



The hammer-head shark is the most curious specimen of the family, and as much feared by men as any.



Blue sharks visit Northern waters, chasing smaller fish right into the fishermen's nets and ruining the latter.



Whales and sharks are alike in this respect, that the biggest of the family are the most peaceful. The big basking sharks are content to take in huge mouthfuls of small fish and to let the rest of animal creation go.

quantities of these teeth have been found in the rocks of certain parts of Europe, while in Florida they were so numerous that the rocks used to be quarried in order that the fossil teeth might be brought to England to be ground up for artificial manure. Some of the fossil teeth are five inches long and four inches thick at the roots.

**THE GREAT SHOALS OF LITTLE SHARKS
THAT WE CALL DOG-FISH**

The shark still comes into the market. His skin is spiny, and we call it *shagreen*. It serves for purses and other things, while the cabinetmaker and other workers in fine wood use it as a better sort of sandpaper. To the Chinese the fins of the white shark are precious for soup. The fins are mainly composed of gelatine, and thousands are imported into China every year. That suggests that many sharks must be caught. And that is true. The number caught every year is about 100,000.

This number does not include the dog-fishes. There are millions and millions of those in our own waters. We rarely fish in the sea without pulling up dog-fish. They are sharks just as much as the hammer-head and white shark are, only they are smaller. They have the rough, spiny skin of the true shark, and very valuable it is. Their bodies contain a useful oil, and their flesh is good for food. We knew this years and years ago, but the fish fell into disfavour, mainly because of its name. So nobody but the poorest of the poor would eat it. It was thrown away, or at least it was supposed to be.

But in England large numbers of dog-fish were secretly taken inland, skinned, and sold as another sort of fish, and nobody was the wiser but the fishermen and the dishonest shopkeepers.

**THIRTY MILES OF SMALL SHARKS, AND THE
BABY SHARK'S CRADLE ON THE BEACH**

Lately, people have recognised that the so-called dog-fish is good for food, and thousands are being caught and sold. The dog-fish eat herrings, sprats, and other small fish, and simply teem round our coast. They fill the fishermen's nets; they swarm upon his lines. Once 20,000 were taken in a single boat's haul, and a shoal of them was seen—an unbroken mass, twenty or thirty miles broad. No wonder that when shoals like this invade our fishing-

stations the fishermen have sometimes to suspend their operations.

The dog-fish are true sharks in the way they deposit their eggs. These appear in tough pouches, which we find on the seashore, and call mermaids' purses, sailors' purses, or sea-purses. From the corners of the purses little tendrils extend. By these the pouch of eggs is anchored to seaweed, and the mother fish hovers round to see that no harm befalls. Those that we find contain, as a rule, no eggs, but are simply the empty cases from which the baby shark has disappeared.

A near ally of the sharks is a singular fish called the chimera. It is the only fish which, as far as we know, produces eggs which imitate their surroundings. These are oval in shape, and bordered with a fringe, so that the egg-case floats about like a piece of seaweed until the little fish is ready to emerge.

**THE HIDEOUS CHIMERA AND ITS EXTRA-
ORDINARY COUSINS IN THE RIVERS**

The chimera is one of the ugliest fishes, and has fallen low in the scale of life. It is a higher form than the shark, from which it is descended, but now it reaches only five feet in length, whereas in the old days there were giant chimeras. Those who named the fish likened it to a mythical monster called the chimera, which, they thought, had the head of a lion, the body of a goat, and the tail of a dragon, from whose nostrils fire issued. Modern sailors have called it the king of the herrings, because of its habit of feeding upon those fish.

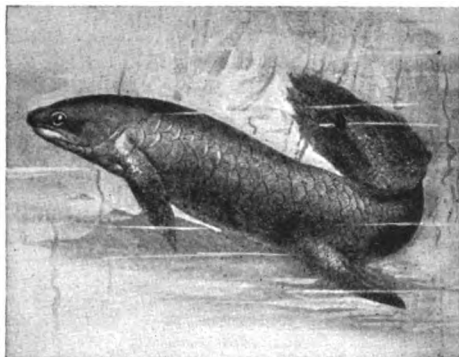
Not only is this fish related to the shark; it is related also to the lung-fishes. These in themselves resemble, to a small degree, the sharks, though there is so little in common between them that they are placed in different classes. The lung-fishes, as their name suggests, breathe by the aid of lungs, which means, of course, that they must rise to the surface of the water and draw their supply from the atmosphere. There are three known sorts. There is the great six-foot lung-fish of the Australian rivers, there is the mud-fish of the South American rivers and swamps, and there is the African mud-fish.

The Australian species can obtain air under water by means of gills, but they have to rise now and then to the top to breathe. The American and African

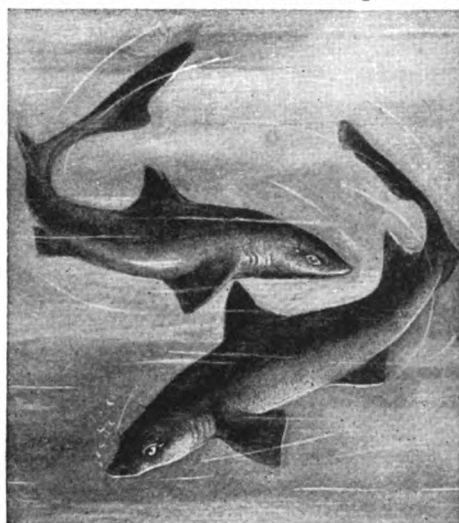
FISHES THAT BREATHE LIKE ANIMALS



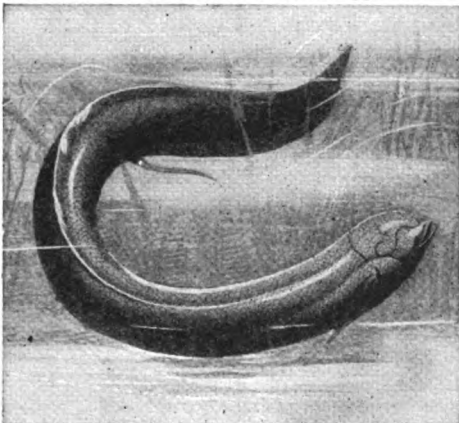
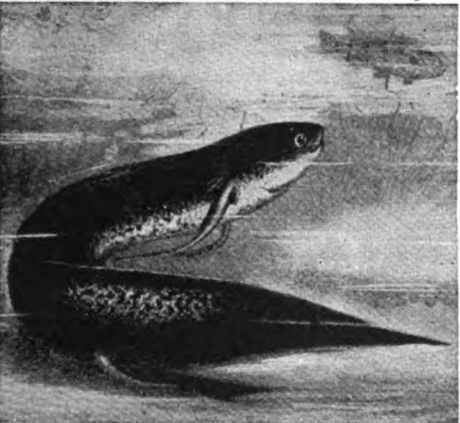
In olden days men likened the chimera to a hideous monster with a lion's head and goat's body, which breathed fire. Now we call it the king of the herrings.



The Australian lung-fish can breathe under water through its gills, but every now and then has to raise its head above the water to fill its lungs with air.



We all recognise the dog-fish and call them by that name. In reality they are small sharks, the only sharks that live off Northern coasts. To the left we have the lesser spotted dog-fish. On the right are two spiny dog-fish. Near the lesser dog-fish we see the pouches, anchored to seaweed, in which its eggs are laid.



Australia has not got all the lung-fishes. Here we have, on the left, the African mud-fish, and, on the right, the South American mud-fish. They both possess lungs, and so frequently rise to the top of the water to take deep draughts of the air that we breathe. The African fish goes to sleep in the mud when his river dries up.

species are not so fortunate, but must rise frequently to the surface of the water to take in air. The South African mud-fish must be considered in advance of his fellows, for when the rivers in which he has his home dry up, he makes himself a sort of nest in the mud, and goes to sleep, caring for nobody. When the waters refill the river channel, he revives, and sets to work to eat and get fat again, like a bear which has been sleeping away the winter.

FISH THAT TRAVELLED ACROSS THE WORLD ALIVE IN CLODS OF MUD

A peculiar feature of these strange fishes is their teeth. These make its mouth a great grinding mill. The teeth are shaped like the antlers of deer, and they fit together, so that shell-fish of quite large size can be easily crushed. When they are out and about the lung-fishes need much food. Their fasts are long. Some of them were dug up from the mud and sent in their clods to Europe. There they were put into a big tank in a hothouse, and revived at once, and began to eat the snails, worms, and small fish thrown to them. When these supplies ended they calmly set to work to eat each other.

The appetite of the lung-fishes must not surprise us. All sea-fishes are hungry creatures. The deeper we go, the more hungry we find them. Their food has mostly to come from the sea above them, and as many fishes are on the look-out at all depths, there is a chance that those in the lowest levels may often have to fast. Hence they have developed an elastic stomach which can extend in the most marvellous way when food does come, like that of the great snakes on land.

THE UGLY RAYS AND SKATES THAT STEAL ALONG THE BOTTOM OF THE SEA

In one, only four inches long, there was found another fish seven and a half inches long, curled up like a ball in the other's inside. Another—a six-foot creature—called the *Plagyodus foxus*, was found to contain several cuttle-fish, many shell-fish and sea-squirrels, twelve young boar-fish, a horse-mackerel, and one of its own species.

Passing now to other members of the shark family, we come to the rays and skates. These are ugly, sluggish things, which move stealthily at the bottom of the sea. They use the tail as a rudder,

and swim by gently moving their fins. Every aquarium has some of these fishes. As they cannot swim quickly, they have to depend largely upon low forms of fish-life, such as backboneless creatures and shell-fish, for their food. But they are coloured so nearly like the mud over which they move that at times they deceive bigger fish into approaching. The ray cannot grasp its big prey as other fish can, for its mouth is below; so it darts over it, holds it down by weight, and then grabs it with its mouth.

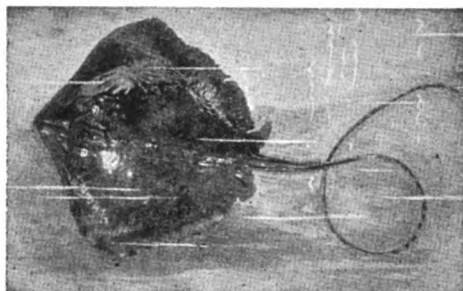
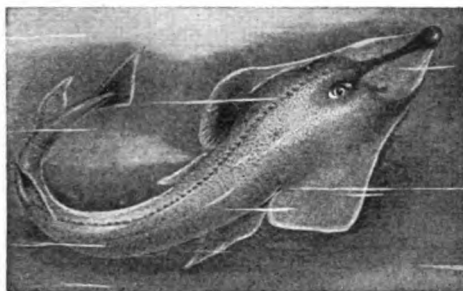
The skate is common enough in our fish-market, and, though it is not delicate fare, poor people are glad enough to eat it, taking care not to swallow the sharp spines with which its back is armed. We have seen an egg of the skate on page 1410. They much resemble those of the dog-fish, but instead of streaming tendrils at the four ends, they have short ends, like handles, to what appears a small, inflated stretcher. Skates reach a length of from two to four feet, but one was caught which weighed as much as 90 pounds.

THE FISH THAT CAN STUN A MAN WITH AN ELECTRIC SHOCK

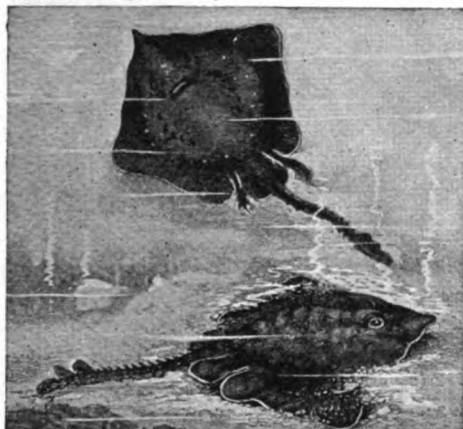
The most remarkable member of the ray family is the electric ray, or torpedo, as it is called. Like the electric eel, it has all the properties of an electric battery. By some marvellous means it has produced electric cells from the muscles of its body, which enable it to stun and kill a fish, and to stun a man if he completes the circuit by touching it with two hands. The electricity from these fish will decompose water, just as did the electric spark set up by the man of whom we read in the story of the men who found electricity, told on page 2113. It can decompose chemical compounds and actually produce a spark. The strength of the shock it gives is sufficient to make a man quite ill for days. How their power works against other fishes may be judged from the fact that an electric ray which was opened was found to contain a two-pound eel and a one-pound flounder, while another had a four-pound salmon in its stomach.

Bad as is the electric ray, the shocks which it can communicate do not compare with those of that terror of certain South American rivers, the electric eel. The nerves of the electric organ in the electric skate arise in the

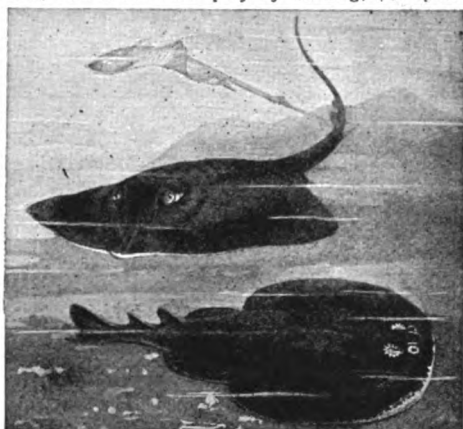
FISHES THAT CARRY ELECTRICITY



The rays are related to the sharks and to the skates. Here we have the halavi ray on the left, and the Indian ray on the right. They live at the bottom of the sea, and catch their prey by cunning, not speed.



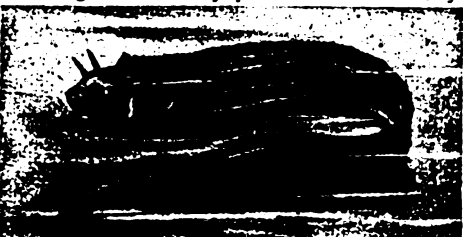
The thorn-back skate is heavily armoured on the back, and sometimes on the sides of the head, with stout claw-like spines. The males have sharp pointed teeth, but the females' teeth are blunt and flattened.



The common skate is accompanied here, on the sea-bottom, by the famous marbled electric ray, which gives forth electric shocks exactly like what we should get from a very powerful electric battery.



The electric eel is the hero of stories more marvellous than true, but there is no doubt that its electric shocks may kill its prey, or stun a man and make him ill.

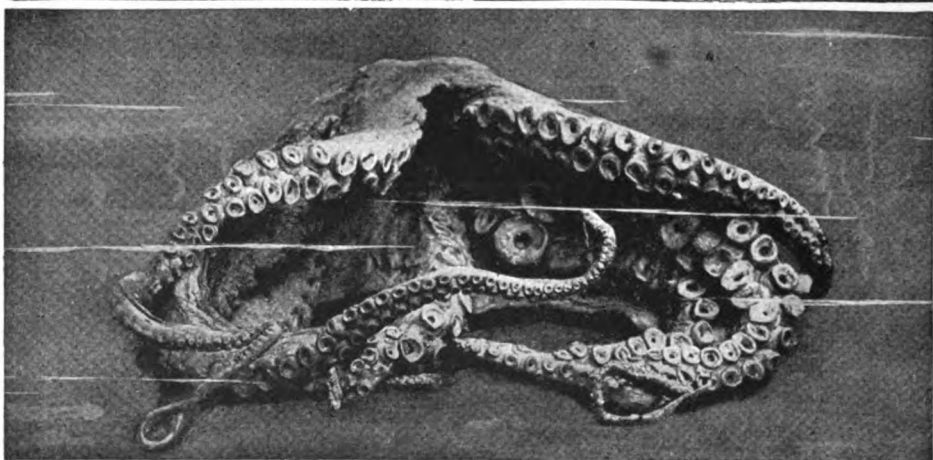
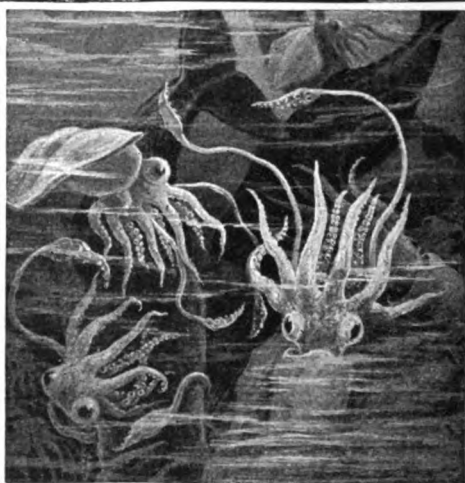


The ribbon-fish is very long, but very thin. It lives far away down in the deep sea, and is only seen on the surface of the water in a dead or dying condition.



Two famous eels now wait to be seen. The first is the conger; the second is the murena. Congers are abundant in most seas. They form excellent food for man, and we are bound to think well of them because they destroy the horrid cuttle-fish. The murena is a sea-eel, six or eight feet long, with big sharp teeth. It savagely attacks men in or out of the water. It is beautifully coloured and spotted and looks like a snake.

THE LONG-ARMED GIANTS OF THE SEA



Of all the deep-sea monsters none cause us more horror than the great squids and octopuses. They are hungry creatures, and with their parrot-like beaks and their rasping tongues, which are like terrible files, they devour any living creature that they can master. With their fearful arms they cling like serpents. Their hold is sure, because each of the terrible arms has a number of suckers, which cling so tightly that a man, to escape, must cut himself free with a knife or axe. The squids and octopuses and small cuttle-fish are all constructed on the same plan. Each carries a bag of ink, and when pursued squirts out the ink, so darkening the water and rendering escape easy. The ink which some octopuses carry is the sepia that we use in painting.

brain, in the electric eel they come from the spinal cord, and over two hundred such nerves have been counted. Their power is amazing. An old story is told in very many books that, when the natives of Brazil want to catch these fish, they drive horses into the rivers, which are attacked so fiercely by the eels that the latter lose their power, and may then be handled with safety. Some of the horses, it is said, are killed by the shocks.

FIFTY KINDS OF FISH THAT STORE UP ELECTRIC ENERGY

Happily, there seems to be no foundation for the tale. But that the eel does lose its power we know from careful experiments. It has a certain amount of energy stored up, and when this is first tapped, it can give so serious a shock that several persons holding hands feel it. When this power is exhausted, the eel must rest before it can give further serious shocks.

Quite fifty different kinds of fish can give electric shocks, but the only serious trouble of this sort is that caused by the ray, the eel, and the malapterurus, or thunderer fish, of the Nile. Here the current comes from two enormous nerves, one on each side. Both the thunderer and the eel are more powerful than the skate, yet the latter can by a single discharge disable a full-grown man. We do not know where these strange creatures got this mysterious power from. The ancients knew of it, and used the electric discharges of the electric ray and eel for curing illness. Since 1772 the subject has been carefully studied by scientists, but though we know all about the structure in which the wonderful power resides, we are still no nearer to learning how it began.

THE STRANGE LIFE-STORY OF THE MYSTERIOUS EELS

All the eels have been a source of mystery to us. For ages men could not understand them. They hide in the mud by day and come out to feed only at night, so they were difficult to study. But the mystery has now been solved. Eels are born at sea, and millions upon millions of them come up the rivers in the spring. Their numbers almost pass belief. Three tons of them were caught in a single day near Gloucester, and as they were so small that it took thousands of them to weigh a pound, we can

reckon for ourselves how many of them there were in this single catch.

Their habits are not like those of ordinary fish. They climb water-gates; they swarm over all sorts of obstructions; they climb the banks and make their way over wet fields and dewy grass to the place to which they wish to go. They spend the summer in the rivers, then in the autumn down they go to the sea. Those which have come up are supposed to be mostly females. Nearly all the young males remain in the sea or at the mouths of the rivers. When the eggs have been laid, the old ones die, and so from year to year we get an entirely new population of eels. Those which remain in the rivers and lakes may go on living from year to year, but they do not multiply. They must have sea-water in which to lay their eggs.

This is not the way the conger-eels live. They are the big people of the family, and are born at sea, where they always remain. They live on cuttle-fish, octopuses, and so forth, and as they are bold and hungry, they are terrible foemen. But they are not so much to be feared as the murena, the great sea-eel with huge teeth, which it uses without distinction upon man or fish.

THE FIGHTING CONGER-EEL, AND THE STRANGE RIBBON-FISH

The congors are bad enough. When pulled up on a fisherman's hook they fight in the boat with great strength, and will bite with the fury of a young bulldog. The sea-eels are clean feeders, but those which come up our rivers, not satisfied with small water animals and the eggs of other fish, delight in the flesh of dead bodies which may be floating in the water.

Many of us, seeing a ribbon-fish for the first time, might take it for an extraordinary form of eel. Its long, thin body does suggest that idea when only one view of it is seen, but upon a closer view we find that, though the whole body is from 15 to 20 feet in length and a foot in depth, the width is only an inch or thereabouts; hence the name ribbon-fish. It belongs to the spiny-finned group, and is related to that remarkable creature, the unicorn-fish, so called from its remarkable spine, which curves like a crest from the tip of the snout back over the head. This is

only about a third of the length of the curiously-shaped ribbon-fish.

The ribbon-fish has been responsible, it is believed, for more than one story of the sea-serpent. Sir Richard Owen, who did not believe in the existence of sea-serpents, declared that one story of the supposed appearance of this monster lay in the fact that a ribbon-fish, sporting on the top of the waves, had been sighted. He may have been right. But it has since been discovered that the ribbon-fish, if seen on the top of the waves, must have been dead. It is one of the deep-sea creatures, and cannot exist near the surface of the waves.

Dead ribbon-fish, which have been discovered cast up on our shores, have been so utterly shattered, through the pressure of the water being withdrawn, that it has been impossible to take them from the sea, their flesh being utterly broken up. When young, their flesh is so extremely thin and filmy that, if they did not live at the bottom of deep seas, where there is little movement of the water, they would be washed to pieces.

THE TERROR OF THE OCTOPUS, WHICH CAN PULL DOWN A BOATFUL OF MEN

Whether there really is such a thing as a sea-serpent we do not know. For hundreds of years men have told of seeing such monsters, but there has generally been an explanation showing that a mistake has been made by on-lookers. A couple of blue sharks floating with their fins high in the air have been proved to be what men mistook for a sea-serpent. A line of gambolling dolphins has misled other mariners. Then there can be no doubt that the enormous octopuses seen far out at sea have caused other errors.

There are many cuttle-fishes off our own coasts, but though they are of the same family as the octopus, they are quite small. The giants live in the Pacific and Indian Oceans, and are the most loathsome things in the sea.

So hideous and repulsive are they that men call them devil-fish. It is impossible to think of a more dreadful creature. Some have huge bodies 19 or 20 feet in length, with a powerful parrot-like beak and a cruel rasping tongue. They have eight or ten terrible arms. These arms in the biggest species are 40 or 50 feet in length. These are armed with suckers, and have claws like a

tiger's. The octopus lurks in waiting for its prey. When this approaches, the terrible arms of the monster are shot out, the claws cling, the suckers make fast. Even a little cuttle-fish clings so fast to one's hand that its tentacles must be cut one by one to make it let go. But with a big one grappling no man could escape. They are said to be able to pull down a boat and all its crew with their fearful arms; and no wonder, when we read of their being able to engage in battle with the great toothed whale.

A FIGHT TO THE DEATH BETWEEN TWO OCEAN MONSTERS

Mr. Frank Bullen, who was for many years a sailor, and who has written fine books since, saw one of these terrible fights while he was at sea. The battle was between a fierce sperm whale and a giant octopus. The arms of the monster were twined about the great whale's huge head. Might not these great writhing tentacles suggest a sea-serpent? Such a sight would make an unpractised observer believe that the fabled monster was actually before him.

The octopus which Mr. Bullen watched had a head big enough to contain 350 gallons, and its eyes measured a foot in diameter. The whale won the battle; it was eating the octopus as Mr. Bullen watched. We may remember the story of three men who were painting the sides of a ship, while the vessel was becalmed at sea, being swept off the vessel by the arms of one of these dreadful creatures and drawn down into the sea. The sailors on board tried to save their unfortunate comrades, and cut off one of the creature's arms with a hatchet. It was as thick as one of the masts of the ship, and the suckers on it were as big as saucepan-lids.

THE CURIOUS INK-BAG WITH WHICH THE CUTTLE-FISH DEFENDS ITSELF

All cuttle-fish carry an ink-bag as a means of defence. If they are about to be attacked they squirt out this liquid, turning the water round about them quite black. The little cuttle-fish round about our shores do this. They have in the midst of their bodies a little shell-like bone of chalky substance, which is often used in tooth-powder. The ink which the octopus carries is called sepia, and is used by artists.

The next story of Fishes is on page 2583.



WHY IS GRANNY'S HAIR GREY?

THE colour of the hair depends upon the quantity of colouring matter that it contains. That is to say, hair containing a great deal of colouring matter, or pigment, as it is called, is very dark; hair containing very little is very light. Now, the production of this colouring material depends upon the whole body being in a good state of health, and able to perform all its functions, and it is controlled to a very large extent by the nervous system.

If anything happens to go wrong with this control, either as the result of disease or the wearing out of nerve power in old age, then the pigment gradually ceases to be produced, and the hair becomes grey, and then quite white. When it is white there is no pigment left in it.

Sometimes, we know, sorrow and trouble will turn the hair grey. This is the result of exactly the same process, only in this case the failure to produce colouring matter, or pigment, is caused by anxiety and sorrow or worry instead of by old age or disease; but in both cases it is the power of nutrition that is affected, when the hair turns grey.

WHAT MAKES OUR EYES BLINK?

The real object of the blinking of our eyelid is to keep the front of

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the eyeball constantly clean. The blinking itself is done by means of

muscles in the eyelids, and the cleaning is done by our tears. In fact, that is really what tears are for. The fluid which we call tears is secreted in a little

gland and carried along a canal, or duct, to the eye, and when our eyelids move up and down in blinking, this watery fluid is poured all over the front of the eye, and it washes away any particles of dust or other irritating substance that may be present. Some animals—snakes, for example—have no eyelids, and therefore never blink, and in these creatures there is a hard film, or scale, over the eye to protect it from injury and dirt.

WHY DO WE SOMETIMES FAINT AT VERY SUDDEN NEWS?

Fainting may be due to various causes, one of which is stoppage of the blood supply to certain parts of the brain, and this happens sometimes as the result of a severe or sudden emotion. The result of such a shock to the mind is a sudden contraction of the blood-vessels, which causes the person to become suddenly pale or white, by preventing the blood from reaching the head. When this happens, a person falls down in a faint. The falling down is

Nature's attempt to put things right, because, when one is lying flat on the ground, it is easier for the blood to reach the brain than when one is standing upright. When people faint in this way, they should be allowed to lie flat and the head should be kept low until they recover consciousness.

HOW IS IT THAT WHEN A WORM IS CUT IN TWO IT STILL LIVES?

All animals except the very lowest depend upon what we call a nervous system, which controls the power of movement, and so forth. Now, when this nervous system is all heaped together in the form of the brain, as it is in man and the higher animals, the life of a creature depends upon that brain being uninjured. But in lower creatures, like the worm, the arrangement of the nervous system is different. It is more scattered over the body, and so, when a worm is cut in half, there is enough nerve matter in either half of the worm to enable it to keep living.

COULD WE WALK WITHOUT OUR TOES?

There is no doubt at all that we could walk without toes, but we should not be able to walk nearly so well nor so gracefully, nor so safely, for the simple reason that our toes spread out over the ground to a certain extent, and so give us a greater space upon which to balance our bodies. But, of course, you can easily understand that in these civilised times, when everybody wears boots, the toes themselves are really very little used. In the early days of the human race, however, they were very valuable, and were capable of much more movement than they are now. A person without toes could easily walk, but his steps would be somewhat uncertain, and his movement more restricted.

WHY DOES SAILING MAKE SOME PEOPLE ILL?

Nobody knows exactly what it is that causes people to be sea-sick. It cannot be only the movement of the ship, because some people are just as ill when the movement is very slight, and are even sick before the ship has sailed. My own opinion is that it is generally the influence of the mind. That is to say, people starting out on the sea remember how very ill they were once before, and begin to think how ill they will be again, and so they suggest to themselves the idea of sea-sickness, and

so are generally ill. In addition, the fact of seeing other people ill is sufficient to induce it. None of these reasons, however, explain entirely why people are sea-sick in the first place, and probably the explanation of that must be found in the effect upon the body of the unusual movement in the ship. I know a case of a person who is sea-sick whenever near the sea—not on it. This would seem to indicate that there is something in the air of the sea itself which is sufficient to upset some people.

WILL FROGS AND FISHES SOME DAY TURN INTO ANIMALS LIKE HORSES?

I suppose you have asked this question because you have learnt that animals were not always as they are now, and so you wonder whether frogs and toads and fishes will in time change to something else. The answer is "No," and the reason is that these animals represent the result of many, many generations of gradual changes until they have been produced in the special form in which we now find them. They are, in fact, like a completely manufactured article, and are therefore as perfect in their way as the horse is in its way. The creatures from which frogs and toads and fishes sprang are not like any of these any more than the raw cotton is like a fully-made shirt.

WHY DO WE EVER STOP GROWING?

What we call growth is the power the cells of the body have of taking nourishment into themselves and so becoming larger, and of dividing and giving rise to other cells like themselves. This power, however, is limited, and every kind of cell can only grow within the limits of its own law—the law of growth. No matter how much food or exercise is taken, the law of growth prevents any number of cells becoming more numerous or larger than a given limit. When the body is young the growth is very active, but as the body grows older the limit of growth is gradually reached, and finally growth ceases altogether.

WHY ARE THERE SOME ILLNESSES THAT WE CANNOT GET TWICE?

This is one of the greatest questions in science to-day, and many very clever men are trying to find out the exact reason why we never suffer twice from certain diseases; in other words, how it is possible for people to become *immune*, or free from these ailments. There is no doubt of the fact that when

people have had small-pox or measles or scarlet fever once, they very seldom suffer from them again, even if there be an epidemic all round them. In some way or other the tissues of the body have become changed as the result of the first attack, and are thus made better able to resist that particular kind of infection. Some people think that our bodies have become accustomed to that infection, so that it does not infect them any more; but, whatever the exact nature of the resisting power is, there is no doubt that it is a very common process in many parts of our nature.

WHY DO WE GET HOARSE WHEN WE HAVE A COLD?

We must understand that the voice is produced in a little box in the throat, called the larynx, in which are two membranes called the vocal chords, stretching across the box, and, by their vibration and contraction, producing the different noises and sounds which make our voice. Now, when we get a cold in the throat these vocal chords swell up and become filled with fluid, and are therefore thick and irregular. The result of this is that they are unable to produce a clear note, and so the voice sounds thick or hoarse. It is as if the string of a fiddle were soaked in hot water in places until it had become swollen or thick. It would then be unable to vibrate properly, and we could not produce a clear note with it.

WHY CAN WE HEAR SO MUCH BETTER OVER WATER THAN OVER LAND?

Sound is composed of waves of different lengths transmitted through the air, and these waves can be interrupted and broken up by coming in contact with any obstacle, as the waves of water are broken up when they strike a rock. Now, on the land sound waves cannot travel very far without striking against houses, or trees, or mountains, or other obstacles to their progress, and these prevent the sound travelling to a great distance. On the sea, however, or on a great lake where the surface is perfectly level, it is possible to hear for a very long distance, simply because there is no hindrance to the path taken by the sound.

WHY DO FISH DIE, ALTHOUGH KEPT IN A JAR OF WATER?

We are all apt to imagine that all that is necessary for the life of a fish is that it should be in water, but, as a matter

of fact, this is not true. It is not the water which keeps the fish alive, but the oxygen in the water, without which no animal, fish, or man can live long. The only reason why fish can live in water better than other animals is that they have a special arrangement in their gills by means of which they can extract this gas from the water better than other animals can. But when a fish is placed in a jar of water it soon uses up all the oxygen that is in it, and when that is the case life is no longer possible. The fish, in fact, is drowned, just as much as a man would be, because he could not breathe under the water, man being able to extract oxygen only from the atmosphere. This is the reason why, if we keep fish in captivity, we have to change the water often in order to supply fresh oxygen.

WHY DO WE SWING OUR ARMS WHEN WE WALK?

It is rather difficult to say exactly why we swing our arms when walking, but there is no doubt that it is much easier to walk in comfort if the arms are allowed to swing naturally than if they are held stiffly by the sides of the body. Probably, therefore, the swing of the arms assists us in unconsciously keeping accurate balance as we move along, first on one foot and then on the other. Perhaps, too, it may be partly a relic of the time when primitive animals used their arms as well as their legs in walking, as a chimpanzee will do. In any case, the fact that it is so much more comfortable to walk swinging the arms seems to suggest that Nature may have intended the swinging to help us in accurate movement.

ARE WE TALLER IN THE MORNING THAN AT NIGHT?

The difference between our height in the morning and at night must be very slight; but if we assume that we are a little taller in the morning the explanation is to be found in understanding exactly how our backbone is made. The backbone consists of a number of bones, or vertebræ, and between each bone there is a disc made of cartilage. The object of this disc is to lessen the shock that would otherwise be felt on moving. Now, after being in an upright position for many hours, it is possible that the weight of the body squeezes these discs somewhat

and makes them a little flatter, so that the total height is slightly reduced. During the night we must suppose that they resume their natural thickness by elasticity, and so stretch the backbone to its full length. In that way we may be a little taller in the morning than we are at night.

WHY ARE BOYS STRONGER THAN GIRLS?

The explanation of the fact that the male sex is generally physically stronger than the female sex is to be found in the ancient history of mankind. In the early days men were generally hunters and warriors, and life was only possible as the result of a severe struggle. After many generations of this it came about that male animals as well as human beings became physically stronger, the duties of the home and the care of the young generally devolving upon the females.

WHAT GIVES US "PINS AND NEEDLES"?

The curious sensation known as pins and needles is caused by continued pressure upon one or other of the nerves, and this is often the result of sitting or sleeping in an uncomfortable or cramped position. The actual cause of the peculiar feeling in the ends of the nerves is not exactly understood.

HOW IS IT THAT SOME ANIMALS CAN DO WITHOUT FOOD FOR A VERY LONG TIME?

A very good example of this process is to be seen in our common snakes, which, after feeding heartily during the summer months, retire into their winter quarters, where they take no food at all. The reason that they are able to do this is because during the months of activity, when they were feeding, they were enabled to store up in the body a large quantity of fat, which represents the excess of the food taken, over what was required at the time. Now, this fat can be used by the body itself while the animal is not actually eating. It is gradually absorbed, or used up. So we find that a snake which, at the end of the summer, was round and fat is extremely thin when it comes out of its winter quarters in the early spring. Many animals have this property of storing up food in the shape of fat in a greater or less degree; indeed, if it were not for this they could not live through the periods when there is very little food to be got.

WHY DO OUR FEET NOT WEAR AWAY AS OUR BOOTS AND SHOES DO?

There is a very remarkable difference between living things and dead things. Boots and shoes are composed of dead tissues which have no further power of growth, and therefore cannot replace those parts of them that are worn out by friction. Our feet, however, are made of living tissues, and the effect of friction and use, when applied to living things, is to cause these tissues to increase in size instead of wearing away. Indeed, if living tissues are not exercised they will not grow properly. In a single sentence the answer to this question is: boots and shoes wear out because they are dead; our feet grow because they are alive.

WHERE DOES THE TADPOLE'S TAIL GO TO?

At a certain stage in the life-history of a tadpole some of the cells within the tadpole's body begin to attack and devour the cells that make up the tail. The tail is gradually eaten away and absorbed until finally, by the action of these cells, there is nothing of it left. The material thus disappears, by the process which is known as absorption; it is "used up" by something else.

HAS THE AMŒBA GOT EYES, AND CAN IT SEE?

The amœba is a very minute living organism composed of one single cell of jelly-like material. It has no special structure at all, and it has therefore neither eyes nor any other special organs of sensation; but although it cannot see in the ordinary sense of the word, this is no drawback, because every part of the amœba's body is capable of performing all the functions necessary to its life. All creatures which are able to do this are said to be generalised, in contrast to those higher animals in which special parts are set apart for different uses, such creatures being termed specialised.

WHAT MAKES SOME PEOPLE DUMB?

As a rule the cause of dumbness has nothing to do with the vocal chords at all, which are always present and apparently normal, but for some reason or other in these people who are dumb the vocal chords cannot be used. That is to say, although the brain may produce an idea, and the person may wish to speak, something has happened which prevents the message being sent from the brain to the vocal

NATURE'S WONDERFUL LOOKING-GLASS



These two pictures show how water, when it is still, becomes a natural looking-glass, and if you turn this page upside down you will find the reflections almost as clear as the actual scenes. The slightest ripple on the water, however, would break up the smooth surface and spoil the reflection. The upper picture shows the Taj Mahal, a beautiful tomb of white marble, built at Agra by an Indian emperor for himself and his wife; and the lower picture is Ightham Moat, near Sevenoaks, the most famous moated house in England.

The top photograph is by E. G. Ponting and the lower one by Leonard Willoughby

chords, and so there is no speech. So that we may say that any disease or injury which destroys that part of the brain called the "speech centre," or any disease or injury to the nerve fibres which pass from the speech centres to the vocal chords, will cause dumbness. Dumbness is sometimes present from birth, owing to some defect in development; at other times it comes on suddenly in after life. Sometimes it is permanent, at other times it only lasts for a short period and the person may recover the power of speech.

WHY DO LOUD NOISES MAKE US DEAF FOR A WHILE?

This is partly because a very loud noise makes such a very strong and powerful impression at the time that no other impression of the nature of a sound can be appreciated until the first one has disappeared. It is just the same with other sensations. We cannot feel more than one very intense sensation at once, and the attention of the mind is given to the most powerful. The deafness following a loud noise, or a box on the ears, is also partly due to the changes in the position of the drum of the ear and the delicate internal parts which take a little while to return to their natural position, because until they do this no other sounds can be properly appreciated.

WHY CAN'T WE REMEMBER WHAT HAPPENED TO US WHEN WE WERE BABIES?

There are many faculties of the mind which we only possess as our brain grows older and gets more exercise, and memory is one of these. We can only remember things by exercising that part of the brain which has to do with memory, and when we are still babies there has not been time for that faculty to develop, although it grows much earlier in some children than in others. Besides this, the things happening to us when we are babies are all of much the same degree of importance to us; we do not yet understand what are the big things in our life, and what are not; and so one thing makes about as much impression upon us as another. Now, memory depends largely upon the impression made at the time of the incident; and it is only when the mind is sufficiently developed to judge of the importance of things that memory becomes a well-marked faculty.

WHY DO WE FORGET SOME THINGS AND REMEMBER OTHERS?

Memory depends very largely on the impression made upon us by various incidents. The things we forget most easily are the things which do not strike us as being of much interest or importance when they occur. They readily escape our attention, and therefore are not impressed upon our memory. On the other hand, those things which appear to ourselves as great events in our lives—though they may not appear important to others—are firmly fixed in our memories, and always remembered, and it is for this reason that many trifling things are never forgotten. They did not appear to us trifling at the time, but made a deep impression.

WHY DOES THE CHAMELEON CHANGE ITS COLOUR?

The object of the change of colour of the skin of the chameleon is to enable it to become like its surroundings at the time, and so aid it in concealing itself. This capacity the chameleon shares with many other lizards, and they are able to change because they possess within the skin a great number of small cells closely packed together, filled with small granules. This causes a white colour by reflecting light. Other cells are full of oil drops and appear yellow; others contain brown or reddish pigment, and the changes in colour are brought about by contraction of different parts of the skin, and the movement of the different pigments. Thus, when all the pigment is forced towards the surface the animal looks quite dark. When the pigment is not so near the surface the colour is changed to green, and where there is no pigment the skin appears yellow. The mechanism which causes these changes appears to be under the control of the will of the chameleon, but, in addition, the external surroundings, such as heat and cold, also cause some changes in the colour.

WHEN A DONKEY EATS A THISTLE, WHY DO NOT THE THORNS HURT HIM?

If you will take the trouble to look carefully into the mouths of different kinds of animals, you will find that the inside of the mouth differs very widely in different species, according to the kind of food the animal lives upon. For instance, in your own mouth you will find that the lining of the mouth is

quite soft and easily injured, whereas in some other animals the membrane which lines the mouth is extremely tough and covered with thick scales, which enable the creature to crush foods which would injure a tender mouth. This is the case to a certain extent in cattle and in all animals which feed upon hard kinds of grass, and the donkey's mouth is another example of the same kind of thing. We may say, if we like, that the donkey eats thistles because he is an ass!

WHY DOES VACCINATION KEEP US FROM HAVING SMALL-POX?

There are some diseases from which a person never suffers twice, because the first attack makes the sufferer immune, or proof against a second attack of the particular microbes that cause this illness. Small-pox is one of the diseases against which we can be so protected. But many years ago a famous man named Jenner discovered that it was not necessary to have the actual disease in order to become protected, but that it was sufficient to produce a very slight illness by vaccination. The effect of this was found to be such that people who were properly vaccinated were quite free from the infection of small-pox for some years, generally five years at least. After that the effect is apt to wear off; and so in some countries it is the custom to be vaccinated every five years.

WHY DOES MUSTARD BURN OUR TONGUE?

There are a number of chemical substances which, when applied to the skin or the tender parts of the body, cause us to feel a sensation of burning; and mustard is one of them. It acts upon the tongue or other sensitive parts as an irritant, causing the blood-vessels in the part to swell up and discharge some of their contents. If sufficient be applied this will form a blister. This is what happens in the case of a mustard plaster, where, after the mustard has been in contact with the skin for a little while, we find that a red patch is produced by the swelling of the blood-vessels. This causes pressure upon the nerves, and irritation of the endings of the nerves, with the result that there is a sensation which we describe as burning. Quite a number of other substances besides mustard have exactly the same effect.

WHAT MAKES A WATER-SPOUT?

Just as the waves of the sea are due to movements of the air, so the very astonishing disturbance of the sea called a water-spout is also due to an unusual disturbance of the air. Sometimes parts of the air get started in a twisting motion, rushing through the air and at the same time turning round and round very quickly, somewhat as the earth rushes through space and turns round all the time. When this happens the sea may be very violently disturbed; and sometimes in the middle of this twisting portion of air there is very little air indeed—it is almost like a hollow twisting column of air. Then the water just beneath may be suddenly sucked up so as to fill the almost empty space inside this twisting column of air, and that makes a water-spout.

WHY DOES A FALLING OBJECT TURN ROUND?

The answer to this is that a falling thing turns round only if a turning motion was imparted to it when it began to fall. If we dropped a ball in such a perfectly even way that every part of it was let go at exactly the same moment—though this is by no means an easy thing to do—then it would not turn round as it fell.

But it happens that almost always, when anything is let fall, it is not let go quite evenly, and so a turning motion is given to it, just as it is given to a rifle bullet, and it goes on turning. Even when this does not happen, an object may be so shaped that one part of it offers more resistance to the air than another. That part will be retarded as the object falls, and so it will acquire a turning motion. This turning affects the flight of anything through the air, and if it be a ball affects it the way it bounces. So that in hitting a tennis-ball, or bowling a cricket-ball, we try to "put a twist on it," and this may make it swerve in a curious line as it twists against the pressure of the air.

WHERE DO JUMPING BEANS COME FROM?

The jumping beans come from Mexico. It is not the bean that jumps, but a little insect inside it. A tree grows in the Mexican swamps near Alamos which has a curious fruit, three-cornered in shape, and divided into three parts, like little pods. In two of these pods are small black seeds; the third part contains a tiny worm, and is what we call the

jumping bean. Before the tree can have its fruit, it must, of course, bear flowers. A little insect visits those flowers, and in part of each deposits an egg. The part of the flower which contains the egg grows with the rest of the flower, but, instead of becoming a pod for the seed of the tree, it turns into a home for the insect, which is in due course to be hatched from the egg.

Later, the flowers lose their petals, and seed-pods form and ripen. In August the seed is ripe. The husk containing the pods of seed and the little pod with the worm inside drops to the ground and splits into three parts—two of seed and the other that we call the jumping bean. Now, the insect has inherited the knowledge that if the bean lies where it falls it will be trodden upon, perhaps eaten by an enemy. So the worm coils itself up, then lets itself go suddenly, like a catapult, and carries its house with it.

It keeps on jumping until the bean is away from the tree on which it grew. In cold weather the little insect lies still and sleeps. As soon as the weather becomes warm, it revives and starts jumping afresh. If a little hole is made in the bean, the worm spins a web and fills up the hole.

The jumping bean is not the only growth in which insects make their homes. Cherry galls on oak-trees, or oak-apples, as most of us call them, are the homes of insects. A little gall-fly pierces a hole in a twig of the tree and in it lays one egg or more. Either the irritation from the wound in the twig or the action of the egg itself causes the twig to form a growth round the egg, hard and smooth. It is quite a pretty little growth, but inside there is one or more insects. The egg hatches, and a grub appears. It eats the inside of the oak-apple, and then may bore its way out into the world, or it may wait until it has changed into a perfect insect, and then come out. There are scores of sorts of gall-flies, but children will not like any so much as the little worm in the famous jumping bean.

WHY HAVE WE LINES ON THE PALMS OF OUR HANDS?

This is a question about which there has been a great deal of argument, but there is not much doubt about the answer now. Some people have said

that the use of these lines was to give us a better hold upon things. It was thought that they should prevent things from slipping, but probably that is not their real use. If it were so we should have to say that they were scarcely worth having. It is much more likely that the use of these lines is to help the sense of touch in our hands and fingers, where touch is so important. By making little valleys and ridges they increase the surface of skin, and by going in different directions they help us to feel the kind of surface that anything which we touch has. The little endings of the nerves of touch are placed to the greatest advantage by means of these lines, and that seems to be why they are so very well marked on just those parts of the skin where delicacy of touch is most important.

WHAT IS THE GOOD OF HAVING TWO EYES?

We may say that perhaps it is not worth while having two eyes, since we seem to see just as well with one as with two. But sometimes we may have noticed that we or other people, in pouring milk or putting a lump of sugar into a tea-cup, have made a mistake, and have put the milk and sugar in the saucer. That is what is very likely to happen to anyone who uses only one eye. The two eyes do not look at anything from exactly the same place, but from rather different "points of view," as we say. The brain takes these two "points of view" and sees from both of them together; so that it is very much helped in judging of the distance of things by the difference between the two images of it seen by the two eyes. It is because we have two eyes that we see things in their relation in front of or behind each other. An ordinary photograph looks flat, because, so to say, the camera only saw it with one eye. But if we take two photographs of a thing, from two points of view corresponding to the distance between the two eyes, and then put the two photographs side by side at the right distance, and look at them with both eyes, through the simple little instrument called a stereoscope, or "solid see-er," then we see the view as if it were solid, or see it "in relief," as people say. We see it as we should have seen the thing itself if we had looked at it with our own two eyes.

EVANGELINE

IN the great comfortable living-room of a Canadian farmhouse the farmer sat smoking before the wide-mouthed brick fireplace. The glow from the burning logs danced on his jolly face and on his strong, plump hand, which now and again drew the pipe from his lips, as he threw back his head and idly watched the smoke wreaths that he puffed into the twilight. Close by his side in the warm glow of the firelight sat his daughter, Evangeline, spinning and softly singing an old French carol of Christmas as she worked. It was the girl's betrothal eve and her thoughts were pleasant ones, for now and again a smile rippled over her face, like a glimmer of sunshine.

Suddenly a sound of footsteps was heard, and the latch of the door was lifted. Evangeline quickly rose to her feet and stood aside in the shadow, shyly waiting, while her father, both hands out in hearty welcome, hurried forward to greet the two men who stood in the doorway.

"Welcome, Basil, my friend," he exclaimed as he jovially thumped the elder on his broad shoulders. "Come over to the fireplace. Yonder on the shelf, thy pipe and box of tobacco is waiting for thee."

In the meantime, Evangeline was shyly greeting the younger man.

"I was thinking of thee, this evening, Gabriel," she whispered.

A quick grasp of her hand was Gabriel's only answer. Silently he drew Evangeline aside in the shadow where they stood gazing out through the small leaded panes over the meadows that sloped down to the ocean, where the moonlight made a dancing pathway over the waters.

"How wonderful it all is," breathed the girl with a contented sigh. Then she stirred a little uneasily. "Thou dost not think we are too happy, Gabriel?" she questioned doubtfully.

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"Nay, dear," her lover eagerly began, but he was interrupted by the front door once more being flung wide open, to admit a little old man, — the notary public.

"Evangeline," called her father, pretending not to know of her whereabouts. "Daughter, where art thou? Here is Father Leblanc waiting to join thee and Gabriel Lajeunesse together."

Blushing, Evangeline came forward, to fetch papers and inkhorn, and to light the bronze lamp on the great, polished oaken table. In the meantime, Father Leblanc had carefully drawn his big horn spectacles from his pocket and was proceeding to fill out the legal papers for the betrothal. It took some time to get the impressive documents duly filled in and sealed. At last, however, they were done, and the three old men drew their chairs close about the fireplace and lit their pipes, while Evangeline went to get a tankard of home-brewed ale from the cupboard. They all drank to the health and the future happiness of the young couple.

"Father Leblanc," said the farmer, as he sipped and puffed, "what dost thou think of the English ships anchored in the bay? They have been there four days and we have heard nothing of their designs."

"I have heard gossip enough," retorted the notary public, wiping the foam from his beard, "but for myself, I do not think they intend to do us any harm."

"Everybody is not of your opinion," interrupted Basil Lajeunesse. "Dost remember how they scattered the village of Port Royal? Some people think they intend to do the same by us and have already fled to the forest."

"For myself," the farmer announced calmly, "I have done nobody any harm and I shall stay where I am. Tomorrow,

as thou knowest, we have all been asked to gather in the church to hear their intentions. I, like Father Leblanc, do not believe they intend us any hurt."

"Well, Benedict Belfontaine," said Basil resignedly, "thou art always the most cheerful of souls. I, for one, am not as hopeful as thou art, for there have been malcontents in the village who have made trouble at times, and the English do not always stop to make distinctions."

Soon the notary rose to take his leave. Basil and Gabriel lingered until they

count the strokes. She had heard that bell many hundreds of times before in her life, calling solemnly to worship or perchance gaily summoning to a marriage service—but today it suddenly seemed to the girl as if there were something foreboding in the sound. She heard the front door closed loudly and ran to the window just in time to see her father striding off down to the village. From every direction she could see men hurrying toward the meeting-house. In the distance she fancied she could catch a glimpse of Gabriel, and strained her



Evangeline.

heard the village bell pealing out the hour of nine from the belfry. Gabriel paused for a moment on the doorstep for a farewell word with Evangeline.

"I will see thee tomorrow after the church meeting," he told her as they parted.

The next morning, Evangeline was up bright and early, busy about her household, chirping gaily to herself as she worked like a happy little sparrow. So the morning passed quickly away. Presently through the crisp, autumn air came the loud clanging of the bell.

"One, two, three, four, five, six," —
Evangeline paused in her dusting to

eyes to make out the beloved form; but it had disappeared in the doorway. She saw the red-coated soldiers file down the village street and march in through the church door, which closed slowly after them. Then all was still and no one was to be seen in the streets, save the occasional figure of a woman or child.

Evangeline shivered. Suppose the church door had engulfed all their men—should never give them up. Suppose—! Laughing a little at her silly fears, Evangeline returned to her work, but not to her singing. Gabriel's words, "I will see you after the meeting," had

filled her morning full of joyous anticipation. Why did he not come!

Hour after hour passed, and Gabriel and Benedict did not return. Unable to bear the suspense any longer, she hurried down to the meeting-house. All was ominously quiet. The doors and the windows were tightly closed and barred. Wild terror took possession of Evangeline. She hurried from door to window, and from window to window, beating her hands against the heavy wooden panels of the shutters.

"Gabriel!" she called, "Gabriel! Gabriel!"

At length, Evangeline made her way into the village, where she found everything in the greatest confusion. The women were gathered together in the market-place, all talking and gesticulating excitedly, while their hungry children whined and tugged at their skirts. Evangeline came to them, her white face set and quiet.

"We can do no good by raising a tumult," she told them. "We can only wait and pray."

As she spoke, a clear, sweet sound came pealing through the twilight.

"The Angelus," cried the woman, and some of them sobbed. "Thank God! They are still alive, or Father Felician would not ring the Angelus!"

With dragging feet they returned to their homes to feed their little ones.

Four days passed and then came the announcement, — the fate of Port Royal had fallen upon Grand Pré. The whole village was to be transported. Everyone exhibited a sort of dreary patience. Stolidly the women gathered together their household possessions, and loading them on to vans, drove down to the seashore to wait for the opening of the church doors, and the return of their fathers and brothers and husbands.

Half way down to the shore, Evangeline waited quietly. Through the sunlight she saw the gleam of the muskets of the oncoming redcoats and she prayed for strength to comfort her dear ones in this terrible hour. The procession approached. Suddenly Evangeline met the bloodshot eyes of Gabriel Lajeunesse fixed upon her and for a moment the girl's composure wavered. Then

forcing back the stinging tears, she held out her hands to him bravely.

"Gabriel," she whispered, as he gathered her into his arms, "be of good cheer. Nothing can hurt us if we love each other."

The man said nothing, only clasped his arms about her as if defying all the powers on earth to wrest that beloved little form from his arms.

Suddenly Evangeline gave a little cry. She had caught sight of her father and the look on his haggard face drove all other thoughts from her mind. Slipping away from Gabriel, she ran to her father's side and put her arms about him.

"Father!" she cried, "Father, dear." But the old man made no reply, and only gazed vacantly before him. Wildly Evangeline called to him and begged him to speak to her, — just one word, but all to no purpose. Overwhelmed with her grief, the girl did not note that in the confusion and noise around her, children were being torn away from their parents, and wives from their husbands. All night long she sat on the seashore, vainly striving with words and caresses to arouse the old man. As they sat there, through the darkness a blood-red blaze mounted suddenly into the western sky. A wail went up from the multitude gathered upon the seashore. The village of Grand Pré was burning. Speechless with horror, Evangeline gazed at the sheets of flame that mounted and leaped against the blackness of the night. Suddenly, as if from a heart that was broken, a loud groan was heard, and Evangeline turned to find her father stretched lifeless upon the sands.

When she came to herself, it was morning and a crowd of compassionate faces were bending over her.

"Thy father is dead," someone told her gently. "We have buried him here on the seashore, so that the British soldiers will not find him."

After the first wild burst of her pain was over, Evangeline sat staring out over the ocean, wrapped in her thoughts and unconscious of the scene of confusion about her. At last a soldier addressed her.

"Come, young woman," he said — there was a note of pity in his rough

voice. "Stop your dreaming and get aboard that rowboat yonder. The ship is going to sail in a half-hour."

With a start Evangeline looked wildly about her. "Where is Gabriel?" she asked, dazedly. "Where is Gabriel?"

"He is on board that ship that is just sailing out of the harbour," someone answered.

For a few moments, Evangeline stood shading her eyes with her palm, gazing after the vessel, fast disappearing into the horizon. At last she spoke, half aloud.

"I will follow thee and find thee wherever they may take thee, Gabriel," she said solemnly as if taking a vow. Then she turned to the soldier who was just then returning. "Lead on to the boat," she said calmly, "I am coming."

Years had passed after the burning of Grand Pré. The Arcadians had been scattered far and wide like snowflakes driven before the wind, and all over North America, little bands of them who had gathered together could be found. Everywhere that Evangeline heard of an Arcadian, she had travelled, always inquiring for one Gabriel Lajeunesse. Often it seemed as if she had come across some trace of him.

"Gabriel Lajeunesse?" the people would say, "Oh, yes, we have seen him. He left here but a short while ago."

So always restless and driven on and on by her weary longing, Evangeline travelled from place to place. Suitors had come and departed, for she had but one answer to give them.

"I am looking for my betrothed, Gabriel Lajeunesse," she would tell them serenely, her calm faith all unshaken though the years slipped by one by one.

She was a fresh young girl when her journey began; she was faded and old when at last she drifted into Philadelphia, and, giving up her fruitless search, became a Sister of Mercy. A fearful plague had descended upon the city, and Evangeline, always gentle and full of love for the weak, joyfully gave up her life to caring for the suffering.

One fair Sunday morning, Evangeline passed through the streets of the plague-stricken city on her way to the alms-

house. The sun was so bright and the air so warm and sweet, it almost seemed as if it were impossible that black death held the land in its grip. A fresh breeze rustled through the treetops and the birds twittered and chirped merrily in the sunlight. Only an unwonted hush in the streets gave sign of anything being amiss. Evangeline drew in a deep breath of the sweet air.

A strange all-pervading sense of fulfilment and of peace crept over her. Half smiling to herself, she bent down to gather a handful of blossoms.

Many a weary head turned on its pillow, as Evangeline entered the poor-house ward, carrying the gay blossoms. Slowly she passed from cot to cot, here leaving a few blossoms on the white coverlet, there shaking and smoothing the pillows for fevered heads, and moistening parched lips or kneeling for a moment at the bedside. As she passed slowly down the ward she suddenly came to a cot, where a stranger had just been placed. Something about the grizzled head, the brown clenched hand, brought Evangeline to a halt, her heart pounding wildly. White to her lips, she clung to the bedpost for support.

"Oh, God," she whispered hoarsely, "Oh, God, it cannot be!"

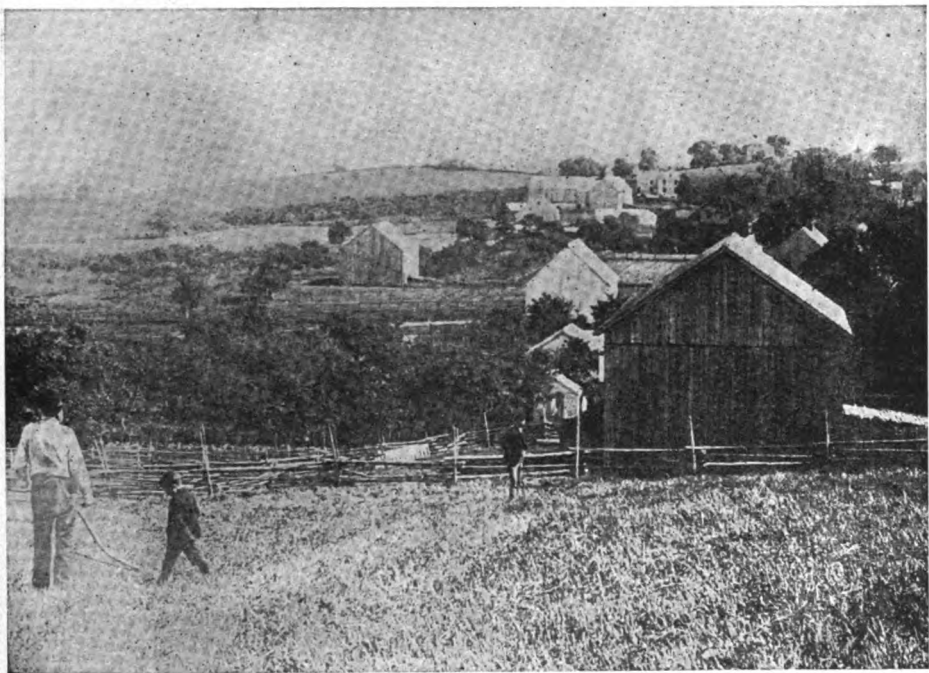
Slowly the man turned his head and looked full at her with hot, unseeing eyes. For one awful moment it seemed as if a flood of blackness was closing in about her. Then, with a cry of unspeakable anguish, she sank upon her knees by the bedside and hid her face in her hands. Presently a hot groping hand touched her cheek.

"Gabriel, my beloved!" whispered Evangeline, suddenly all-forgetful of self, and putting out her strong, gentle arms, she gathered him to her. As if in response to her voice — to her touch — a light slowly dawned and grew in the eyes turned upon her. The fever-cracked lips moved slowly, as if they were speaking a dearly loved name. Only for a moment — then the light flickered and died into darkness. The fingers that had closed over Evangeline's slowly loosened and fell limply back upon the white cover. Evangeline's search was over.

THE HOME OF EVANGELINE

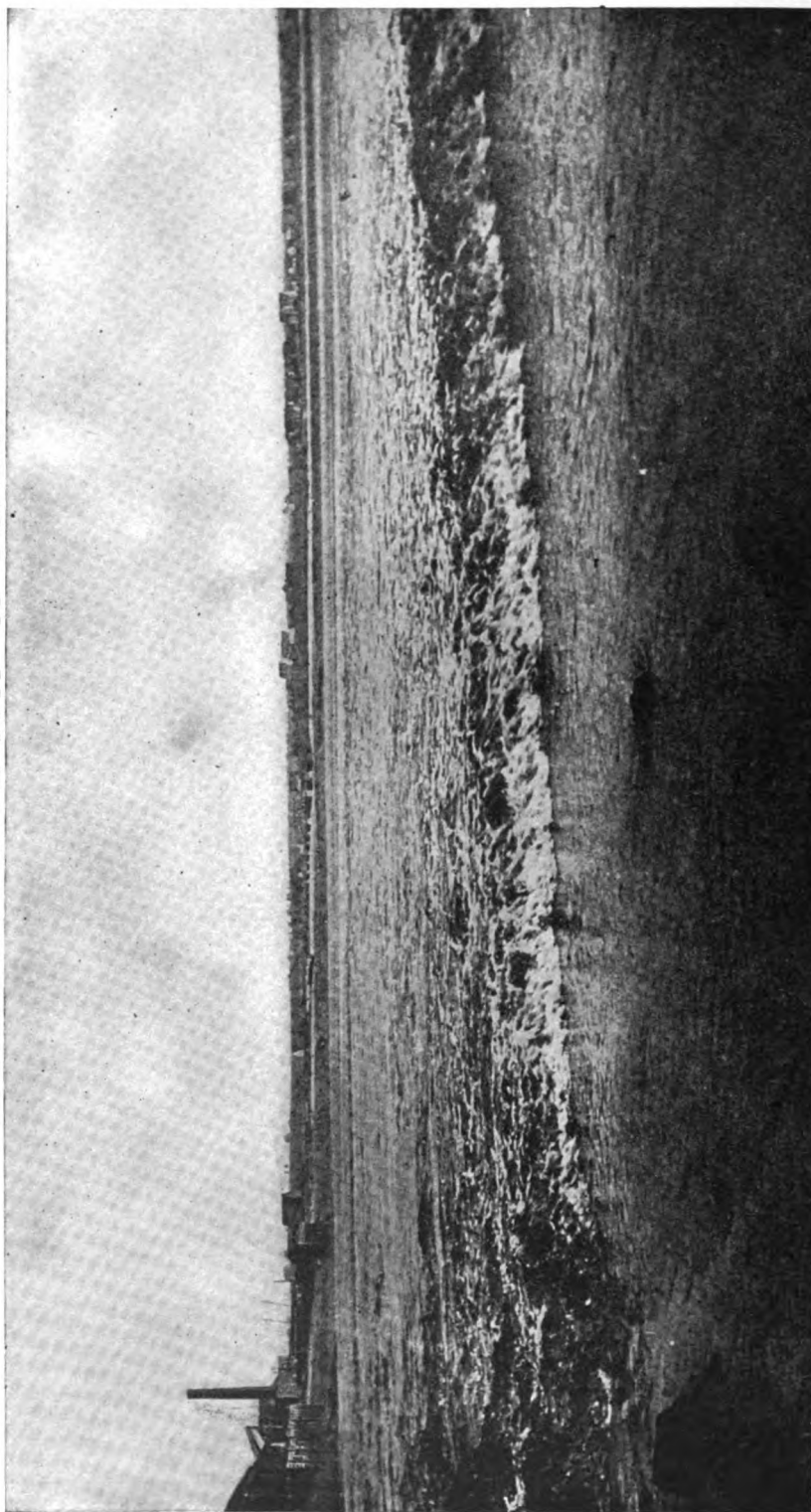


Here is a typical scene near the mouth of the Gaspereaux River, in that part of Canada once known as Acadia, a land of peace and plenty, in which was situated the happy village of Grand Pre, the home of Evangeline before it was scattered by the British soldiers in the year 1755.



Here is a picture of Grand Pre as we see it today. Some time after the burning of the village a handful of the inhabitants crept back to the site of their old homes and many of them rebuilt their houses. Descendants of the old French Acadians can still be found in Grand Pre and its vicinity.

THE BEAUTIFUL BAY OF FUNDY



The Bay of Fundy, between the shores of New Brunswick and Nova Scotia, is noted for the highest tide in the world, rising to 60 or 70 feet at the head of Chignecto Bay. This unusual height is due partly to the influence of the Gulf Stream, and partly to the peculiar funnel shape of the bay itself. In order to accommodate travellers it has been necessary to build the landing stages at different levels. The country around the Basin of Minas has been diked, and it is no uncommon sight to see a vessel sailing along a channel in a hayfield.



CONQUERORS OF THE SEA

IN reading the adventures of Robinson Crusoe we all feel thankful on coming to the part where he is saved from the sea. But when he settles down on his island, gloom at first comes upon us, for there he is in that desert spot, alone, surrounded by the sea. It is a dreadful position for a human being, so lonely, so hopeless. Well, suppose there were no ships, no balloons, and no aeroplanes, the inhabitants of Great Britain, for example, would be forty million Crusoes. They could not send letters to their friends abroad. Their Colonies would be of no use to them, for there would be no means of sending settlers to them; nor, if the people were already there, of exchanging goods or messages with them. "There would be the telegraph for communication, would there not?" asks someone. But if we had no ships we should have no telegraph across the seas, for we should never have been able to lay the cables.

With no ships and no telegrams the sea would be a source of horror to us. It would be a fearful void, shutting us out from communication with other parts of the world. And that is just what the sea was to men before they learned the art of shipbuilding and navigation. By a

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series of grand schemes men have changed all this. There was the gradual building of great ships; there was the making of accurate instruments by which men could tell at any moment of the day or night their exact position at sea, no matter how far they went; there was the application of steam to the purpose of the ship; and there was the laying of the ocean cables.

These things accomplished, the sea remained no longer an enemy. The ocean became a roadway, leading to all parts of the world. Storm and tempest, fogs and hidden rocks, still cause disaster, it is true, but the accidents are rare, considering the enormous number of ships there are. The sea has become one of our best friends.

And all this wonderful change in our affairs we owe to a very small number of men. It will be enough for our purpose if we glance briefly at the careers of the chief figures in these revolutions in the history of the world.

Every time that some great change has been proposed for the benefit of mankind, people with power and influence, who ought to have given their encouragement and support, have always been among the first to say: "It can't

be done," and "It shan't be done." That is just what happened concerning the steamship and the ocean telegraph. Take first the steamship. No invention ever had a harder struggle for life. Fate and men both seemed against it.

THE MAN WHO FIRST MADE A MACHINE DRIVE A BOAT THROUGH WATER

The Spaniards say that a countryman of theirs, named Blasco de Gary, who lived in the sixteenth century, made a model steamboat in 1543. But we have to be careful about believing stories of this sort without clear proof. Every country is anxious to claim the honour of an invention, if the invention has proved a success.

A century later, Denis Papin, a famous Frenchman, appeared on the scene. He was a physician, born at Blois in 1647, and he died in England in 1712. A very talented man, he was associated with several of the famous men of whom we have read in the story of the men who found electricity, told elsewhere. Frenchmen declare that he invented the steam-engine and steam navigation, and in many books his name is given as having achieved that result. But that is wrong. He was a man of splendid brain, but his thoughts did not turn to the making of a true steam-engine as we know it. What he invented was an engine worked not really by expanding steam, but by atmospheric pressure. His idea was a brilliant one, and it led to great things in the hands of Newcomen, Brindley, and Smeaton. We must remember that it was not the true steam-engine; but as his engine, such as it was, was fitted to a model boat and drove the boat through the water, Papin well deserves his place in the gallery of heroes who brought about steam navigation.

TWO GREAT INVENTORS WHO WERE RUINED BY THE FRENCH REVOLUTION

Many names appear for a little time upon the page of the history of this invention. One of them, Jonathan Hulls, patented a sort of steamboat in England in 1737, but years were to pass before anything practical was done. More men crowded to the task, and we find several skilled inventors working in rivalry at the same time. One of these was the unfortunate Marquis de Jouffroy, who, born in France in 1751, set himself, at 26, the task of driving a boat by steam.

He adopted Papin's idea, and in eight years made three successful boats. The first was 40 feet in length; but it was the third which is said to have been the first real steamboat. He might have gone on to complete success, but the French Revolution drove him, an exile from his country, to America. When he returned to France, he was too late; others had seized his ideas and begun to reap the honours which should have been his. He died in 1832.

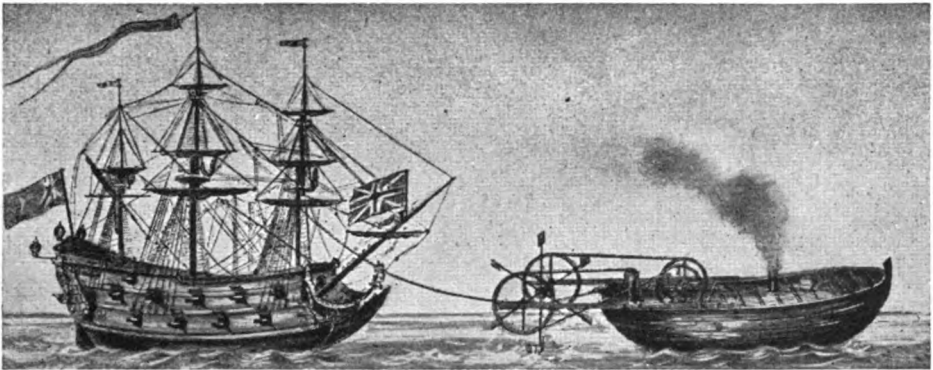
At about this time two American engineers, named James Rumsey and John Fitch, were making experiments. Rumsey is of importance to us as being the man who first turned the attention of Robert Fulton to the subject. Fitch came into prominence in the American Revolution, acting as gunsmith for the Americans, who were fighting for their liberty against the British. His first model steamship was made in 1785, but five years later he built a proper vessel, with paddle-wheels at the sides. He went to France just as Jouffroy was leaving, and, like Jouffroy, was ruined by the Revolution. It is said that while he was there his plans were shown to Fulton. Anyhow, he returned to America starving, and killed himself.

THE MAN WHO CAME TO PAINT PICTURES BUT MADE A STEAMBOAT

It was for something quite different from shipbuilding that Robert Fulton went to England. He was a painter of portraits, born in Pennsylvania in 1765, but set out for England in 1786, in order that he might study this art under Sir Benjamin West. He became acquainted with Rumsey, who had also gone to England earlier, and, after discussing inventions with him, gave up all thought of painting. Fulton's brain teemed with ideas. He invented things for the improvement of canals, for cutting and polishing marble, for twisting rope, for iron bridges, for spinning flax, for dredging rivers, and for making boats go under water and blow up ships. But the great work of his life was done for the steamship.

In 1802 he built a steamship, but its engine was so heavy that it fell through the bottom of the vessel into the River Seine, in France, where he was trying it. He did not lose heart, but recovered the engine and built it into a stronger boat. This he made to go, but it was too

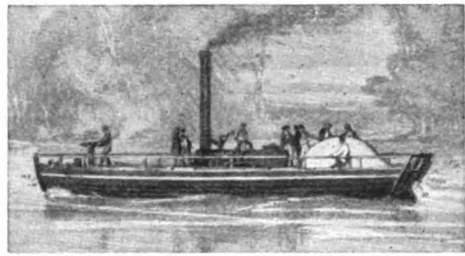
THE FIRST STEAMBOATS EVER MADE



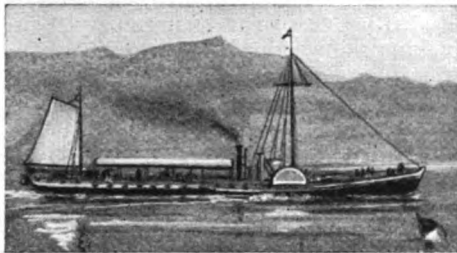
Although the honour has been claimed for several different men, yet it probably was an Englishman, Jonathan Hulls, who built the first steamboat, in 1706. Here we see Hulls' own drawings of his vessel, which are still in the patent office.



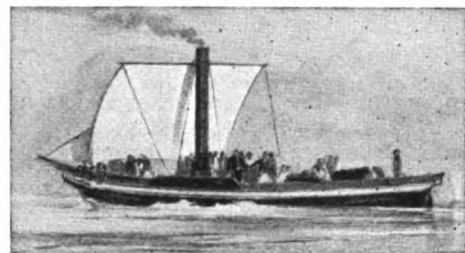
One of the very early steamboats was built by a Scotchman, William Symington, in 1788. It had two paddle-wheels right in the middle of the deck.



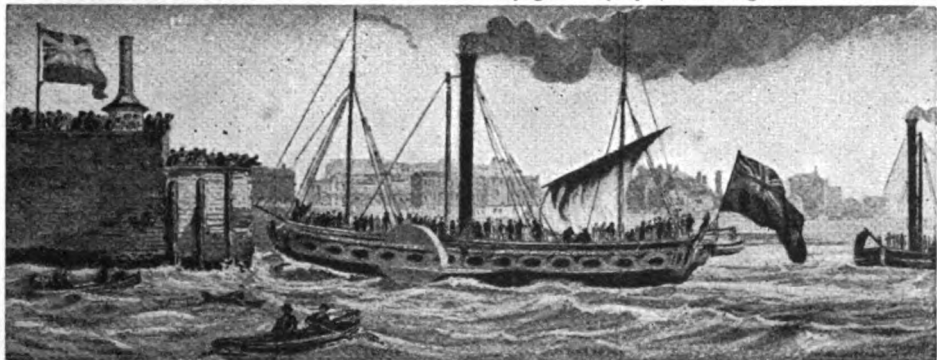
In 1803 Symington built another steamboat for Lord Dundas, and it towed barges on the Forth and Clyde Canal until its use was forbidden by the canal owners.



An American inventor, Robert Fulton, was the first man to make steam navigation commercially successful. When in 1806 he built this steamboat on the Hudson.



Another success was by a Scotchman, Henry Bell, who built this ship, called the Comet, in 1812. It scared many ignorant people, who thought it was a monster.



Inventors were now busy improving the steamboat, and steamers began to be built everywhere. When steamboats appeared on the Thames, there was much opposition from the boatmen. By 1837, however, steamboats ran regularly from London to Margate, and here we can see two London steamers approaching Margate Pier.

slow to be successful. Going back to England, he prepared plans and had an engine built by Boulton and Watt, of whom we have read in another part of our book. Then he came to America and left the engine to be brought over, packed up in a ship. When it arrived, he set to work to put it together. His story, told in his own words, gives us an excellent idea of the hard lot of the inventor of those times.

ROBERT FULTON'S FIRST STEAMER, AND THE SCOFFING OF STUPID MEN

"When I was building my first steamer in New York," he wrote, "the work was viewed by the public either with carelessness or contempt, as a useless scheme. My friends, indeed, were civil, but they were shy. As I had occasion to pass daily to and from the building yard while my boat was in progress, I often loitered unknown near idle groups of strangers, and heard them scoff and sneer and ridicule. Never did a single encouraging remark, a bright hope, a warm wish, cross my path. My work was always spoken of as Fulton's Folly."

But at last the ship was built, and set out with passengers for a trial trip. The vessel moved off, went a little way, then stopped. Everybody except Fulton thought that this was the end—that he had failed, as they all had expected. But he went below and soon put right some trifling mishap, and the boat steamed away, while people were saying: "I told you it would be so; a foolish scheme; I wish we were safely out of it." The vessel went its way, a journey of 150 miles in 32 hours. Fulton was delighted, but his friends still doubted; they thought that the vessel would never be able to get back to New York, and that if it did it could never make another trip. No wonder he felt discouraged. He himself wondered if such a voyage could be repeated, and if it could, whether it was of any value.

WHY ONE OF THE EARLY STEAMBOATS WAS ALLOWED TO FALL TO PIECES

Fulton was the first man, therefore, to make steam navigation what we call a commercial success. Fitch had shown that something of the sort could be done, but Fulton profited by Fitch's experience and by that of Jouffroy. He died in 1815, but not until he had built several other boats.

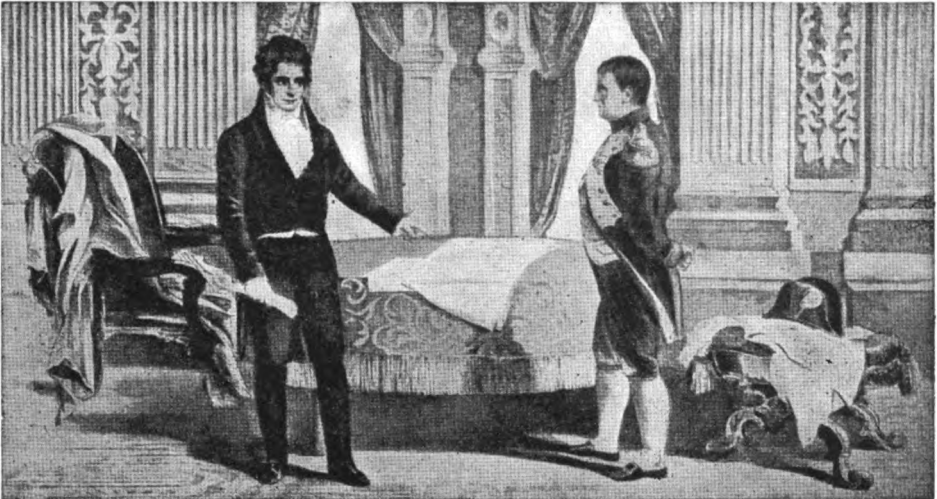
Fulton's successful steamer was launched in 1807. Nineteen years earlier a successful steamer had been launched in Scotland, but this was not a commercial success. It was built by William Symington, a Scotch mechanic, who was born in 1763, and died in 1831. He first of all built a steam-engine to run on the roads, then carried out the building of the steamship for a thoughtful Scotsman named William Miller. Symington's vessel for Miller was succeeded by another which he built for Lord Dundas. It was launched on the Forth and Clyde Canal, and, without any trouble, towed two barges, weighing together 140 tons, a distance of 20 miles against a powerful wind. This was still five years earlier than Fulton's success. But what happened? The owners of the canal said that the steamer would create such a current that it would wash away the banks of the canal, and so this fine steamer was run aground and allowed slowly to fall to pieces on the bank of the canal. Fulton saw this vessel, and doubtless gained a hint or two from it.

A POOR MAN WHO CONFOUNDED THE WISDOM OF THE WISE

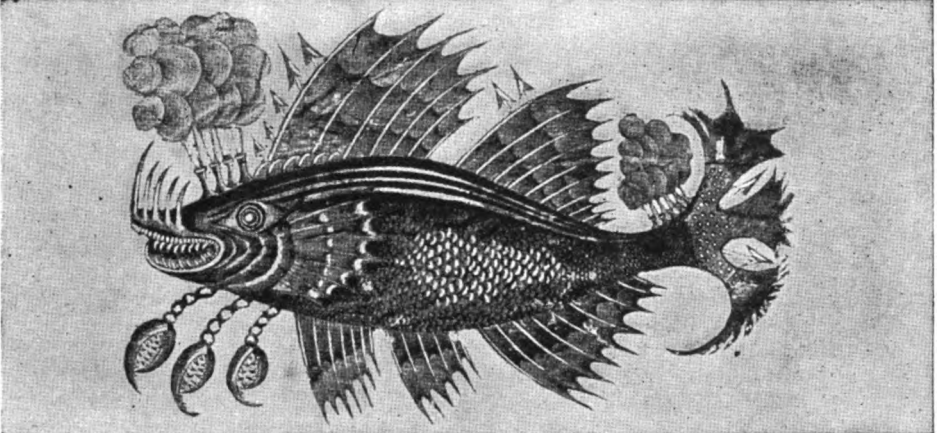
But Symington's work was not all wasted. One of the men employed in making the woodwork of his first vessel was Henry Bell, the son of poor Scottish parents. Born in 1767, he followed first one trade and then another, and seemed unlikely to do any good until he was brought face to face with the problems which the luckless Symington was trying to solve. Symington's experiments convinced Bell that success might yet be gained with steam-vessels, and for the next thirteen years he gave all his thoughts to the plan.

We hear of him in 1800 trying to make the British Government believe in the possibility of the scheme, but he was unsuccessful. How could he hope to succeed in official circles when one of the greatest and best men of the day—Sir Joseph Banks, President of the Royal Society—could say to all the proposals for vessels driven by steam-engines: "A very pretty plan, but there is just one point overlooked—that the steam-engine requires a firm basis on which to work." Talented man though he was, Banks himself overlooked one point, that even though it floated on

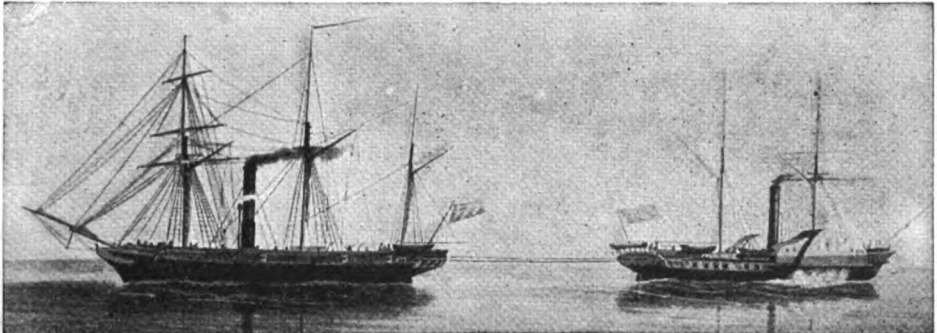
HOW NAPOLEON LOST STEAM POWER



Fulton, the American, went to France and offered to build a steam navy for Napoleon. "Great man," said Fulton, "if you will support me, you can have the most powerful navy in the world." But the French scientists told Napoleon that steam would not drive a child's toy. Napoleon was in Elba when he first saw a steamboat.



Fulton also invented for Napoleon a submarine boat, and, with three friends, he remained under water for one hour. This boat was to fire a torpedo, or, as Fulton called it, "a carcase of gunpowder." But nothing came of the invention, and here we see an amusing caricature of the submarine, which was published in America in 1811.



A great step forward was taken when men learned to drive a boat by a propeller at the end, instead of by paddle-wheels at the sides. Both methods had their supporters, and in 1845 there was a great test, which resulted in a triumph for the propeller. Two steamships, the *Rattler*, the first warship to have a propeller, and the *Alecto*, a paddle-boat, had a tug-of-war, as shown here, and the *Rattler* pulled the *Alecto* quite easily.

* Copyright by The Century Co.

water, the hull of a ship does give the firm basis the steam-engine requires. Bell gave up hope of encouragement from the Government, and when he had managed to get some money, he set to work in 1811 and had a little steamship of his own built on the Clyde.

HOW SCOTTISH INVENTORS AND ENGINEERS LED THE WAY WITH STEAMBOATS

The ship was called the Comet, and was launched in January, 1812, beginning at once to carry goods and passengers on the Clyde. Great was the terror that it created among ignorant people. They thought, as they saw it puffing along, snorting sparks and smoke, and going against the wind and the tide, that it was some evil monster. When it approached the shore to pull up, they ran away and hid themselves.

News of the Comet's success soon spread abroad, and in 1813 we had the first of the Thames steamers, run by a man named Dawson, while a courageous man named Lawrence, of Bristol, sent up a steamer from his native city to carry the people of London up and down their great river. The opposition of the Thames boatmen proved too much for Lawrence, and his vessel had to return to the River Severn. But the steamship industry was now fairly founded, in spite of the "wise" men and the Government; and many ships were built on the Clyde to run between Glasgow and Liverpool and other ports.

The success of the Glasgow-to-Belfast boat in 1818 was important because this was the first ship to go out from the coast regularly, making a port in another island its goal. The owner of the Rob Roy, as it was called, was David Napier, a first-rate engineer of Glasgow. It was built by William Denny, of Glasgow, from whose works came several other steamers which set all the world wondering.

THE FIRST CROSSING OF THE ATLANTIC OCEAN BY STEAM AND SAILS

James Watt, whom we got to know on page 610, played an important part in the development, his steam-engines being largely employed. He was one of the first men to cross to the Continent by the new method, a steamship taking him to France in 1817.

From this time forth there was no more opposition to the steamship as a means of sea passage. The next important step was its first voyage

across the Atlantic. This was made by an American ship called the Savannah, but she did not steam all the way. She was built as a sailing ship by Francis Fickett, of New York, in 1818; but it was decided afterwards to fit her up with a steam-engine. This was done, and she set sail for England from Savannah on May 24, 1819, reaching Liverpool twenty-seven days after.

The greater part of the distance had been covered by the help of sails, steam having been used only for eighty hours. The Savannah returned to America and was not considered useful, for her engine was taken out and she depended, until she was wrecked, upon her sails. Therefore, although America claims to have sent the first steamship across the Atlantic, we must remember that she sailed for the greater part of the voyage, and steamed only a little now and then, about one hour's steaming for eight hours' sailing. Six years afterwards an English yacht, named the Falcon, went by sails and steam to India.

HOW TWO REAL STEAMSHIPS REACHED NEW YORK ON ONE DAY

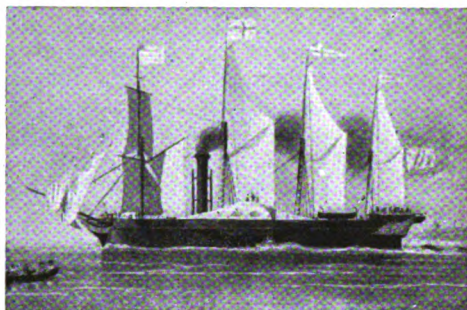
The first crossing of the Atlantic by a real steamship was completed in 1838, when, on the same day, two English vessels steamed into New York. They were the Great Western—a steamship built by Sir Isambard Kingdom Brunel, whom we have already met on page 616—and a smaller vessel, called the Sirius. The Sirius had started from England four days ahead of the Great Western, but the Great Western, being bigger and stronger, nearly caught her up, and the Sirius reached New York only a few hours ahead. The journey had taken the Sirius eighteen days, and the Great Western only fourteen, instead of the month which a sailing ship required.

The steamboat was now a success. There was a long fight between rival sides to get the screw propeller used for driving ships instead of the old wheels at the sides called paddle-wheels, but in the end the screw won for all but smooth waters. Similar doubt had to be overcome before the iron ship was built to take the place of wood. Still later there has come another change in the method of driving the ship. The new plan is called the

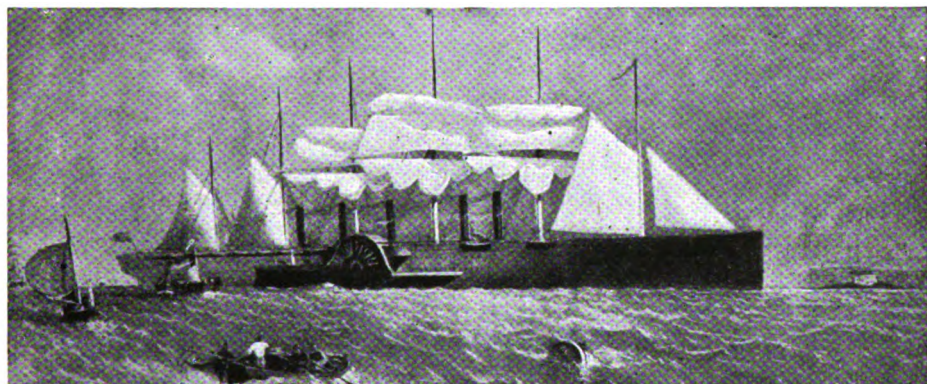
THE COMING OF THE GREAT STEAMSHIP



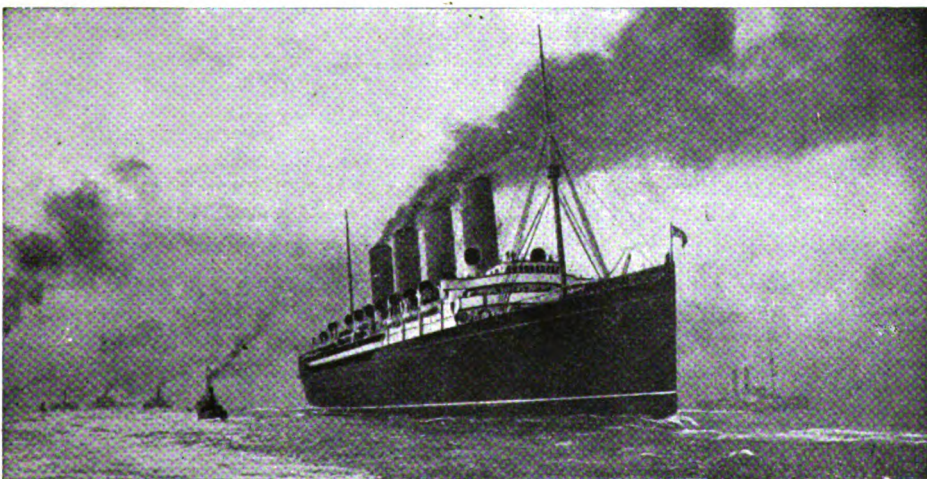
The Americans claim the honour of sending the first steamship across the Atlantic. The Savannah, shown in this picture, was fitted with engines, and crossed the Atlantic in 1819 in 27 days, but she used her sails most of the way. She afterwards became a sailing ship.



The honour of sending the first steamship across the Atlantic perhaps belongs to the British, for in 1838 two English steamships, the Great Western, shown here, and the Sirius, steamed into New York together. Only 392 tons of coal were burnt on the voyage.



When the Great Eastern was launched at Millwall, London, in 1857, it was the wonder of the world, and no one thought that such a monster could be surpassed. Its length was 680 feet, or an eighth of a mile, and the engines were 1,000-horse power. This ship cost nearly a million sovereigns, but it was always meeting with accidents. Its only good work was to lay the Atlantic cable. The Great Eastern had both paddle-wheels and a propeller.



The Great Eastern has now been left far behind in size, the mammoth liners of to-day, like the Mauretania and the Lusitania, being 100 feet longer than the Great Eastern, and their engines being 68 times more powerful. In this picture we see the Mauretania leaving the River Tyne, where she was built in 1907. She has beaten the records of all previous steamships by crossing from Queenstown to New York in 4 days, 10 hours, 21 minutes.

The photograph of the Hon. C. A. Parsons, on page 2467, is by Elliott & Fry, and that of Signor Marconi by Lafayette, London. The photograph of the Mauretania is by Messrs. Thompson & Lee, and the top two pictures on page 2471 are from the Century Magazine.

steam-turbine. Many people had tried to perfect an engine on these lines, but Charles A. Parsons, a very clever Englishman, has been most successful. With his new method of driving a vessel we have bigger steamers than ever. The biggest in the world are over 780 feet in length, and carry 3,000 people at the rate of almost thirty miles an hour.

HOW THE STEAMSHIP LED TO THE INTRODUCTION OF THE OCEAN TELEGRAPH

The faster and farther we ourselves travel, the faster must our messages go. Therefore, when steamships began to cross the ocean, men began to wish for a method whereby news could travel still more rapidly across the waters. We read on page 2113 how men discovered electricity, and we see how the way was prepared for the telegraph cable which runs under the sea. All we need do here is shortly to recall the trials of the man who laid the first cable under the Atlantic, enabling us to have immediate communication with England. The man was Sir Charles Tilston Bright, who gained his great triumph when he was only twenty-six—the same age at which Mr. Marconi, years and years afterwards, sent his first message across the sea without the help of telegraph wires.

Other men, before Bright, tried to solve the problem. Sir William O'Shaughnessy Brooke succeeded in 1838 in sending messages over a wire which passed through a river in India. Professor Samuel Morse, who gave America her telegraph, and whose system of signals for telegrams is everywhere used, sent messages through a copper wire laid in the water of New York Harbour. It was a great feat, but he was terribly poor at the time. "I am crushed for want of means," he wrote. "My stockings all want to see my mother, and my hat is hoary with age."

THE FIRST TELEGRAPH WIRES THAT RAN FROM LAND OUT TO A SHIP AT SEA

Next an American, named Ezra Cornell, got a cable to work through twelve miles of water. That was in 1845. The cable worked well for some months, but was then broken by ice. Cornell deserves to be remembered as the man who founded the famous Cornell University in America. In 1846 an Englishman named Charles West tried to lay a line from England to France. He got as far as Portsmouth Harbour, where,

holding the end of his cable in a boat, he sent messages by it to the shore. Poverty prevented him from carrying out his scheme.

The first real success was a curious one. The cable was laid for two miles in the waters of the English Channel, in January, 1849, then brought to land at Folkestone, and joined to a wire on land 83 miles long, but it carried messages to London, and back to the ship at sea which held the end of the cable.

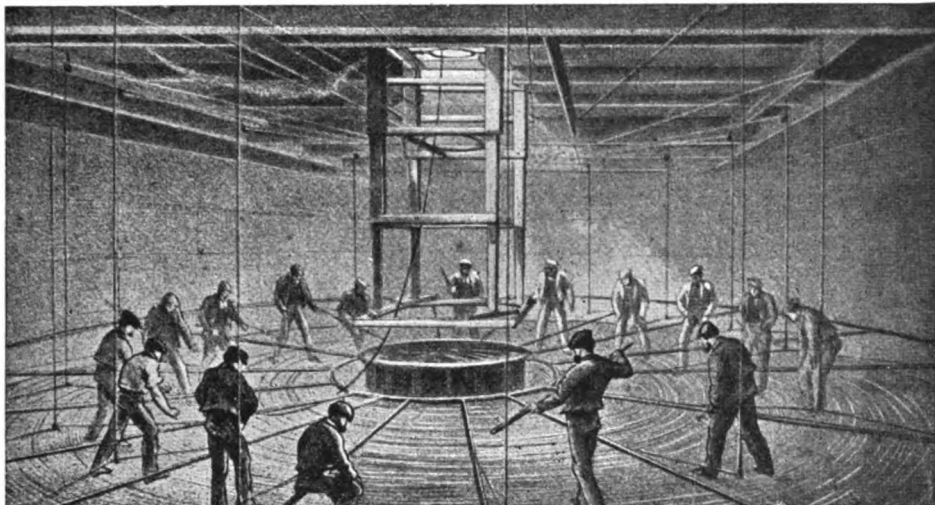
Many minds in England and America were now fixed on the idea. In America Cyrus West Field, who had made a fortune as a paper manufacturer, but died a poor man, was doing all he could to promote schemes for a cable from America to England; in Great Britain Jacob and John Watkins Brett, two brothers, were trying to get the Government's permission to start a cable between England and France. After much annoying delay they got a cable fixed from Dover to Calais, entirely at their own expense.

THE FISHERMAN WHO DRAGGED UP A CABLE IN HIS NET

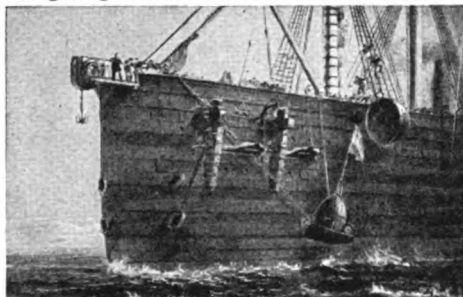
The ship with the cable started in August, 1850, and the wire was soon landed at Calais. Messages were sent over it by Queen Victoria and the Emperor Napoleon III., but then the cable suddenly snapped; an ignorant fisherman had dragged it up with his nets and broken it in the belief that it was a new kind of seaweed! Still, the wire had served its purpose by showing what it could do. A new one was soon laid, and others linking other places followed.

People had by this time ceased to regard the cables as seaweed, or to believe that to make signals they had to pull at the cables like bell-wires. So now there was a serious proposal to lay a cable through the Atlantic, and the man chosen for the work was young Charles Tilston Bright. Of course, the wise men said that the thing could not be done. Sir George Airy, whom we have met on page 1662, was one of the most confident of the opponents. It was impossible, he said, to sink a cable to the bottom of the deep sea, and, if it were possible, such a cable would not convey signals. Well, the Bretts met Cyrus Field, who went over to England, and they formed a company and instructed Charles Tilston Bright to carry

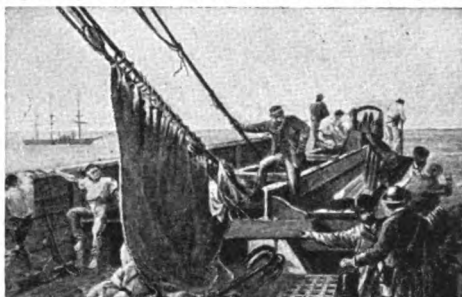
LAYING A CABLE UNDER THE SEA



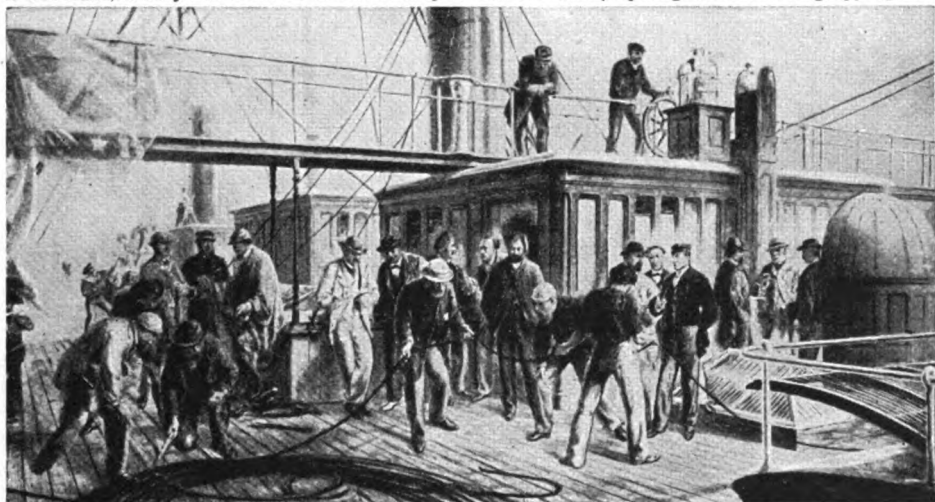
No ship but the Great Eastern could have carried the 2,300 miles of covered wire required for the Atlantic cable. The whole was stored in three enormous tanks, which were afterwards filled with water to keep the cable from getting too hot or too cold. Here we see the cable passing out of one of the tanks as it was being laid.



The first cable laid by the Great Eastern broke, and had to be grappled for five miles under the sea. When it was found, a buoy was let down to mark the spot.



The lost cable was found by dragging over the bottom of the ocean with a large iron with hooks. Here we see the men preparing to lower the grappling-iron.



It was only after many failures that the lost cable was at last found. There was much anxiety as the end was hauled up from the bottom of the sea, but just as it came into sight it slipped away, and all the work of grappling had to be done over again. Here we see the scene when at last the cable was brought on board.

out the work of joining Britain to America by telegraph beneath the ocean.

Bright was a very young man, but he had a wise head. Born in 1832, he was to have gone to Oxford University had not his father lost most of his money. As it was, he had to earn his living, and at nineteen was already doing splendid work in establishing the telegraph system in England. Soon afterwards he laid a cable between England and Ireland. Thus he was well prepared for his work in the Atlantic.

HOW THE CABLE SNAPPED IN MID-OCEAN AND LAY BROKEN UNDER THE SEA

It was on August 5, 1857, that one end of the cable was brought ashore near Valentia, Ireland. The next day the expedition set off. The British Government had supplied two ships and the American Government had supplied two. The cable had to be dropped overboard as the ships travelled to sea.

After a bad start, the ships got 380 miles out, when the cable suddenly snapped, and the two ships had to return to Plymouth leaving the broken cable at the bottom of the sea. It was necessary to raise more money to buy 900 miles of extra cable—a terrible expense. The money was found and the cable bought, and in June, 1858, the ships started off again. When they got out into the Atlantic, they encountered a frightful storm, which lasted a week. Nearly everything in the ship on which Bright sailed was smashed. Many men were injured, and the ship was so badly strained that again and again she almost sank and lost the precious 250 tons of cable which she carried. This time the ships started by laying the cable from mid-ocean, one going towards Newfoundland and the other towards Ireland. But repeatedly the cable broke, owing to the bad workmanship of those who had made it.

HOW A QUEEN'S MESSAGE FLASHED ALONG A WIRE FROM ENGLAND TO AMERICA

The second voyage was a failure, and blank despair reigned in England. However, a few steadfast friends bore up under the blow. They got more money and sent out another cable. Again the ships carrying the two halves of the cable parted in mid-ocean, and this time each arrived at its destination carrying the land-end of the cable with it. Thus one half was drawn up on

dry land at Valentia, where the first expedition had started, and the other was landed at White Strand Bay, Newfoundland. The Englishmen who had found the money on their side of the ocean cabled to their friends who had found money in America, expressing their joy at the outcome of their labours.

Then the first public message was sent from Queen Victoria to the President of the United States. The cable lasted long enough to prove that messages could be sent by electricity under 2,000 miles of sea. In all 271 messages were sent; then, after two months, the cable ceased to work.

It was too weak, and there were many faults in it. This latest failure was very disheartening, but the great idea, now proved possible, could not be lost. During the next two years a new company was formed, and in 1865 the *Great Eastern*, the greatest ship built up to that time, set sail with yet another cable. This time a much stouter cable was employed. It was 2,300 miles in length and weighed many tons. But again trouble followed, for the cable broke.

THE CABLES THAT CARRY MESSAGES ALONG THE BEDS OF ALL THE OCEANS

Still another cable was sent out, and this was finally got across, Ireland and Newfoundland being connected by it on July 27, 1866. In the following year the cable 1,100 miles long lost by the *Great Eastern* in the preceding year was found, and, a fresh section having been added, a second cable to Newfoundland was completed.

Sir Samuel Canning had charge of the engineering work in the *Great Eastern* cable-laying, but Sir Charles Bright was the company's adviser, and we may in a way regard him as the father of Atlantic cables. He did other great work in this cable-laying, and before he died, in 1881, he saw all the principal oceans lined with cables to carry news to the various points of the compass as fast as thought can travel.

The cable-layers and the men who built the steamships were the men who bridged the seas for us. Since then Mr. Marconi has still further lessened the opposition of the sea by inventing a system of telegraphy for which we need no wires; and other clever men have also invented similar wonderful systems.

The next stories of Men and Women begin on page 2532.



WHEN THE WHITE SHIP WENT DOWN

WE do not know very much about Prince William, the only son of Henry I., except that his father was very fond of him and that he very much disliked the people of Normandy, which his father had conquered. But there is one deed of his which we like to recall, because it shows he could think of another's safety before his own, and by it he lost his life at the age of eighteen.

Prince William's father was constantly at war with the French king, who resented the presence of the English in Normandy, and especially of King Henry, who had unjustly taken it from his brother Robert and his son.

In 1120 Henry made peace with the King of France, and set sail from Barfleur, in Normandy, on his return to England. The wind was favourable, and the vessel was soon out of sight of land. Prince William and his courtiers were not ready to start with the king, and it was not until night-fall that they left the port, for the stupid courtiers gave wine to the sailors, and then the rowers were not in a fit condition to take the boat safely across the Channel. It was called the *Blanche Nef*, or White Ship, and was commanded by the same man who had rowed Prince William's grandfather across to the conquest of England 54 years before.

CONTINUED FROM 2368



Some of the sensible people refused to trust themselves to the incapable sailors, and those who remained in the boat soon repented doing so. There was no moon, and the man who was steering drove the vessel on to one of the dangerous rocks near Alderney. There were nearly 300 people on board, and they managed to lower a boat, and put Prince William with a few others into it. Then the prince remembered his half-sister, and ordered the little boat to return to rescue her. But directly the small boat got alongside the ship, the frantic people jumped into it, and, of course, the boat was sunk.

It is said that only two men got away from the wreck. One was the captain, who afterwards drowned himself when he knew the prince was lost; the other was a butcher of Rouen, who clung on to the mast, and was picked up by a fishing boat next day. It was he who told the news of the wreck and the way Prince William lost his life, and how 140 young men belonging to noble families had died.

Not one of the courtiers dared to tell the king the fate of his only son, in whom all his hopes centred, but at last the nobles sent a weeping page to him with the tidings that the White Ship was lost, and all had perished. It is said that King Henry fainted, and was never seen to smile again.

BRAVE COUNTESS JOAN OF BRITTANY

ACROSS the English Channel, in the far north-west of France, is Brittany, where the people are kinsmen of the Cornish and the Welsh, and the English kings longed for the possession of this country in the Middle Ages.

Now, it happened that a Duke of Brittany died, leaving no child to succeed him, and a dispute arose between Charles, Count of Blois, who had married the daughter of the duke's next brother, and John, Count of Montfort, the youngest brother.

Edward III. of England took the side of John of Montfort, and the French that of the Count of Blois. The French captured Nantes, where John of Montfort was, and the King of France kept him a close prisoner in the Louvre.

But John of Montfort had a brave wife, Joan, who never dreamed of giving way to her misfortunes. She summoned the inhabitants of Rennes before the castle where she lived, and, presenting to them her little son, appealed to them to rise and defend the last male heir of their ancient line of dukes. The English, she said, would surely come before long to the help of a brave people.

Her appeal to the Bretons was not in vain, and the men rallied round the countess, who then visited other towns and arranged for their defence, proving herself a skilful leader and most able general. Sending her little son over to England for safety, she then returned to Hennebont, near the coast, there to await succour from England.

The Count of Blois thought he could soon conquer a duchy defended by a woman, and so he gathered an army, captured Rennes, and besieged Hennebont.

The countess put on a suit of armour, mounted a war-horse, and was ever on the walls where the attack was sharpest, encouraging her men at every point,

and directing their defence. Noticing the camp of the besiegers unguarded one day, she led 500 men to it through a postern gate in the walls, and setting fire to the baggage, diverted the attention of the enemy. Then she found herself and her little band cut off from the town, but she galloped away into safety and reached Auray. Five days later she fought her way back into Hennebont. There she found the Bishop of Leon about to surrender

the town to her enemy the Count of Blois.

Day after day dawned, night after night passed, but no succour from England came to the despairing town. At last one day, when the bishop was actually discussing the terms of surrender with the Count of Blois, the countess mounted yet once more a high tower and looked towards the sea. Shading her eyes with her hands, she gazed longingly across the water. Were the English ships never coming? Ah, what was that small speck in the distance, and another, and yet another? Eagerly she

watched, until now there was no longer any doubt. It was really the English fleet, coming at last to her aid.

Soon after, Sir Walter Manny brought the vessels into the harbour, attacked the camp of the besiegers, and burned it to ashes. A treaty was made by which the Count of Montfort was set free, but he died soon after in one of the frequent encounters. Through it all the English king, Edward, proved a firm friend to the countess, and supported the cause of her little son. Though after a long struggle Brittany became part of France, yet the brave countess upheld her son's rights, so that, when older, he ruled as Duke of Brittany, and was known as John of Montfort.

The next Golden Deeds are on page 2491.



Presenting her little son to the people, the countess appealed to them to rise and defend the heir of their ancient line of dukes.



KING BRUCE AND THE SPIDER

ELIZA COOK was a busy writer, both of prose and verse, who was born in 1818 and died in 1889. She was not in any sense a remarkable poet, and the following verses from her pen, chosen for the Child's Book of Poetry, owe their interest as much, indeed more, to the legend they relate than to the manner of its telling. But the poem has a simple vigour and a direct appeal that make it particularly suitable for young people. The story has long been a favourite one to illustrate the wisdom of "try, try, try again," as the well-known proverb in rhyme advises us, "if at first you don't succeed."

KING BRUCE of Scotland
flung himself down
In a lonely mood to
think;
'Tis true he was monarch, and wore a
crown,
But his heart was beginning to sink.
For he had been trying to do a great
deed,
To make his people glad;
He had tried, and tried, but couldn't succeed;
And so he became quite sad.
He flung himself down in low despair,
As grieved as man could be;
And after a while as he pondered there,
"I'll give it all up," said he.
Now just at that moment a spider dropp'd
With its silken cobweb clue;
And the King in the midst of his thinking
stopp'd
To see what that spider would do.
'Twas a long way up to the ceiling dome,
And it hung by a rope so fine;
That how it would get to its cobweb home
King Bruce could not divine.
It soon began to cling and crawl
Straight up with strong endeavour;
But down it came with a slippery sprawl,
As near the ground as ever.
Up, up it ran, not a second it stay'd
To utter the least complaint;
Till it fell still lower, and there it laid,
A little dizzy and faint.
Its head grew steady—again it went,
And travell'd a half-yard higher;
'Twas a delicate thread it had to tread,
A road where its feet would tire.

CONTINUED FROM 2408



Again it fell and swung
below,
But again it quickly
mounted;
Till up and down, now fast, now
slow,
Nine brave attempts were counted.
"Sure," cried the King, "that foolish
thing
Will strive no more to climb;
When it toils so hard to reach and cling,
And tumbles every time."
But up the insect went once more,
Ah, me! 'tis an anxious minute;
He's only a foot from his cobweb door,
Oh, say will he lose or win it!
Steadily, steadily, inch by inch,
Higher and higher he got;
And a bold little run at the very last pinch
Put him into his native cot.
"Bravo, bravo!" the King cried out,
"All honour to those who *try*;
The spider up there defied despair,
He conquer'd, and why shouldn't I?"
And Bruce of Scotland braced his mind,
And gossips tell the tale,
That he tried once more as he tried before,
And that time did not fail.
Pay goodly heed, all ye who read,
And beware of saying, "I *can't*."
'Tis a cowardly word, and apt to lead
To Idleness, Folly, and Want.
Whenever you find your heart despair
Of doing some goodly thing;
Con over this strain, try bravely again,
And remember the Spider and King.

THE THREE FISHERS

In this fine poem by Charles Kingsley the tragic fate that so often awaits our toilers of the sea is described with great dramatic power. We cannot read it without a feeling of sympathy for the fisherfolk, and especially for their womenkind, who have to wait with anxious hearts at home when the storm has overtaken their loved ones on the deep.

THREE fishers went sailing away to the West,
Away to the West as the sun went down ;
Each thought on the woman who loved him
the best,

And the children stood watching them out
of the town ;
For men must work, and women must weep,
And there's little to earn, and many to keep,
Though the harbour-bar be moaning.

Three wives sat up in the lighthouse tower,
And trimmed the lamps as the sun went
down,

And they looked at the squall, and they
looked at the shower,
And the night rack came rolling up, ragged
and brown ;
But men must work, and women must weep,
Though storms be sudden, and waters deep,
And the harbour-bar be moaning.

Three corpses lay out on the shining sands,
In the morning gleam as the tide went down,
And the women are watching and wringing
their hands,

For those who will never come home to
the town.
For men must work, and women must weep,
And the sooner it's over, the sooner to sleep,
And good-bye to the bar and its moaning.

THE LAST CHARGE OF THE FRENCH AT WATERLOO

Sir Walter Scott is always seen at his best, both in poetry and in prose, where he is picturing in vivid words the excitement of the fray when a battle is at its most critical moment. In these lines we see how alive his verse could be under the inspiration of his subject.

ON came the whirlwind—like the last
But fiercest sweep of tempest-blast—
On came the whirlwind—steel-gleams broke
Like lightning through the rolling smoke ;

The war was waked anew,
Three hundred cannon-mouths roar'd loud,
And from their throats, with flash and cloud,
Their showers of iron threw.

Beneath their fire, in full career,
Rush'd on the ponderous cuirassier,
The lancer couch'd his ruthless spear,
And hurrying as to havoc near,
The cohorts' eagles flew.

In one dark torrent, broad and strong,
The advancing onset roll'd along,
Forth harbinger'd by fierce acclaim,
That, from the shroud of smoke and flame,
Peal'd wildly the imperial name !

But on the British heart were lost
The terrors of the charging host ;
For not an eye the storm that wiew'd
Changed its proud glance of fortitude ;
Nor was one forward footstep stay'd,
As dropp'd the dying and the dead.
Fast as their ranks the thunders tear,
Fast they renew'd each serried square ;
And on the wounded and the slain
Closed their diminish'd files again,
Till from their line scarce spears' lengths
three,

Emerging from the smoke they see
Helmet, and plume, and panoply—

Then waked their fire at once !
Each musketeer's revolving knell,
As fast, as regularly fell,
As when they practise to display
Their discipline on festal day.

Then down went helm and lance,
Down were the eagle-banners sent,
Down reeling steeds and riders went,
Corsets were pierced, and pennons rent ;
And to augment the fray,
Wheel'd full against their staggering flanks,
The English horsemen's foaming ranks
Forced their resistless way.

Then to the musket-knell succeeds
The clash of swords, the neigh of steeds—
As plies the smith his clanging trade,
Against the cuirass rang the blade ;
And while amid their close array
The well-served cannon rent their way
And while amid their scatter'd band
Raged the fierce rider's bloody brand,
Recoil'd in common rout and fear
Lancer and guard and cuirassier,
Horsemen and foot,—a mingled host !
Their leaders fall'n, their standards lost.

THE HORSE

To Miss Jane Taylor we owe many pleasant little poems on the most familiar things of everyday life, and six or seven of her pieces have already appeared in these pages. In giving a further example from her pen, it may be remarked that this used to be a favourite piece in the school-books thirty or forty years ago, but its quiet humour and the lesson it teaches still merit for it the attention of the young reader.

A HORSE, long used to bit and bridle,
But always much disposed to idle,
Had often wished that he was able
To steal unnoticed from the stable.

He panted from his inmost soul,
To be at nobody's control,
Go his own pace, slower or faster,
In short, do nothing—like his master.

But yet he ne'er had got at large,
If Jack (who had him in his charge)
Had not, as many have before,
Forgot to shut the stable-door.

Dobbin, with expectation swelling,
Now rose to quit his present dwelling,
But first peeped out with cautious fear,
To examine if the coast were clear.

At length he ventured from his station,
And with extreme self-approbation,
As if delivered from a load,
He galloped to the public road.

And here he stood awhile debating
(Till he was almost tired of waiting),
Which way he'd please to bend his course,
Now there was nobody to force.

At last unchecked by bit or rein,
He sauntered down a pleasant lane,
And neighed forth many a jocund song,
In triumph, as he pass'd along.

But when dark night began t'appear,
In vain he sought some shelter near,
And well he knew he could not bear
To sleep out in the open air.

The grass felt very damp and raw,
Much colder than his master's straw ;
Yet on it he was forced to stretch,
A poor, cold, melancholy wretch.

The night was dark, the country hilly,
Poor Dobbin felt extremely chilly,
Perhaps a feeling like remorse,
Just then might sting the truant horse.

As soon as day began to dawn,
Dobbin, with long and weary yawn,
Arose from this his sleepless night,
But in low spirits and bad plight.

If this (thought he) is all I get,
A bed unwholesome, cold and wet,
And thus forlorn about to roam,
I think I'd better be at home.

'Twas long ere Dobbin could decide
Betwixt his wishes and his pride,
Whether to live in all this danger,
Or go back sneaking to the manger.

At last his struggling pride gave way ;
The thought of savoury oats and hay
To hungry stomach was a reason
Unanswerable at this season.

So off he set with look profound,
Right glad that he was homeward bound ;
And, trotting fast as he was able,
Soon gained once more his master's stable.

Now Dobbin after this disaster,
Never again forsook his master,
Convinced he'd better let him mount,
Than travel on his own account.

THE HORNED OWL

In this poem Barry Cornwall, two of whose poems we have already read on pages 704 and 1276, gives us a more sympathetic and friendly description of the bird of night than poets, as a rule, are inclined to devote to the owl. His poem also conveys a thought that is worth thinking over. It reminds us that, although we may be apt to consider the owl a lonely bird, we are wrong in thinking so, for there is a companionship of the night as of the day.

In the hollow tree in the old grey tower,
The spectral owl doth dwell ;
Dull, hated, despised in the sunshine hour ;
But at dusk he's abroad and well :
Not a bird of the forest ere mates with him ;
All mock him outright by day ;
But at night, when the woods grow still and dim,
The boldest will shrink away.
Oh, when the night falls, and roosts the fowl,
Then, then is the reign of the hornéd owl !
And the owl hath a bride who is fond and bold,
And loveth the wood's deep gloom :
And with eyes like the shine of the moonshine
She awaiteth her ghastly groom ! [cold
Not a feather she moves, not a carol she sings,
As she waits in her tree so still :
But when her heart heareth his flapping wings,
She hoots out her welcome shrill ! [howl,
Oh, when the moon shines, and dogs do
Then, then is the joy of the hornéd owl.
Mourn not for the owl nor his gloomy plight !
The owl hath his share of good :
If a prisoner he be in the broad daylight,
He is lord in the dark green wood !
Nor lonely the bird, nor his ghastly mate ;
They are each unto each a pride—
Thrice fonder, perhaps, since a strange dark fate
Hath rent them from all beside !
So when the night falls, and dogs do howl,
Sing ho ! for the reign of the hornéd owl !
We know not always who are kings by day,
But the king of the night is the bold brown
owl.

ROBERT OF LINCOLN

"Robert of Lincoln" is considered one of the finest bird poems ever written, and was composed by William Cullen Bryant, the well-known nature poet of our land.

MERRILY swinging on brier and weed,
Near to the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name.
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Snug and safe in this nest of ours,
Hidden among the summer flowers.
Chee, chee, chee.

Robert of Lincoln is gayly dressed,
Wearing a bright, black wedding-coat ;
White are his shoulders, and white his crest
Hear him call in his merry note,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Look what a nice new coat is mine ;
Sure there was never a bird so fine.
Chee, chee, chee.

Robert of Lincoln's Quaker wife,
Pretty and quiet with plain brown wings,
Passing at home a patient life,
Broods in the grass while her husband sings,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Brood, kind creature, you need not fear
Thieves and robbers while I am here.
Chee, chee, chee.

Modest and shy as a nun is she ;
One weak chirp is her only note ;
Braggart, and prince of braggarts is he,
Pouring boasts from his little throat,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Never was I afraid of man,
Catch me, cowardly knaves, if you can.
Chee, chee, chee.

Six white eggs on a bed of hay,
Flecked with purple, a pretty sight :
There as the mother sits all day,
Robert is singing with all his might,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Nice good wife that never goes out,
Keeping house while I frolic about.
Chee, chee, chee.

Soon as the little ones chip the shell,
Six wide mouths are open for food ;
Robert of Lincoln bestirs him well,
Gathering seeds for the hungry brood :
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
This new life is likely to be
Hard for a gay young fellow like me.
Chee, chee, chee.

Robert of Lincoln at length is made
Sober with work, and silent with care,
Off is his holiday garment laid,
Half forgotten that merry air,
Bob-o'-link, bob-o'-link,
Spink, spank, spink,
Nobody knows but my mate and I,
Where our nest and our nestlings lie,
Chee, chee, chee.

Summer wanes ; the children are grown ;
Fun and frolic no more he knows,
Robert of Lincoln's a hum-drum drone ;
Off he flies, and we sing as he goes,
Bob-o'-link, bob-a'-link,
Spink, spank, spink,
When you can pipe that merry old strain,
Robert of Lincoln, come back again.
Chee, chee, chee.

THE OVERLAND MAIL

This poem by Rudyard Kipling shows us the hero in the man who does the common everyday services of life, and is one that every child should know.

In the name of the Empress of India, make way,
O lords of the jungle wherever you roam,
The woods are astir at the close of the day—
We exiles are waiting for letters from home—
Let the robber retreat ; let the tiger turn tail,
In the name of the Empress, the Overland Mail.

With a jingle of bells as the dusk gathers in,
He turns to the footpath that leads up the hill—
The bags on his back, and a cloth round his chin,
And, tucked in his belt, the Post-Office bill—
"Despatched on this date, as received by the rail,
Per runner, two bags of the Overland Mail."

Is the torrent in spate ? He must ford it or swim.
Has the rain wrecked the road ? He must climb by the cliff.
Does the tempest cry "Halt" ? What are tempests to him ?
The service admits not a "but" or an "if" ;
While the breath's in his mouth, he must bear without fail,
In the name of the Empress, the Overland Mail.

From aloe to rose-oak, from rose-oak to fir
From level to upland, from upland to crest,
From rice-field to rock-ridge, from rock-ridge to spur,
Fly the soft-sandalled feet, strains the brawny brown chest,
From rail to ravine—to the peak from the vale—
Up, up through the night goes the Overland Mail.

There's a speck on the hillside, a dot on the road—
A jingle of bells on the foot-path below—
There's a scuffle above in the monkeys' abode—
The world is awake, and the clouds are aglow—
For the great sun himself must attend to the trail ;
In the name of the Empress, the Overland Mail.

MY MARYLAND

"My Maryland" was a poem composed by a Confederate, J. R. Randall, during the Civil War, and the soldiers sang it as they marched through Maryland trying to arouse the inhabitants for the Confederate side.

The despot's heel is on thy shore,
Maryland !
His torch is at thy temple door,
Maryland !

Avenge the patriotic gore
That flecked the streets of Baltimore,
And be the battle-queen of yore,
Maryland, my Maryland !
Hark to an exiled son's appeal,
Maryland !
My Mother State, to thee I kneel,
Maryland !
For life and death, for woe and weal,
Thy peerless chivalry reveal,
And gird thy beauteous limbs with steel,
Maryland, my Maryland !

Thou wilt not cower in the dust,
Maryland !
Thy beaming sword shall never rust !
Maryland !
Remember Carroll's sacred trust,
Remember Howard's warlike thrust,
And all thy slumberers with the just,
Maryland, my Maryland !

Come, 'tis the red dawn of the day,
Maryland !
Come with thy panoplied array,
Maryland !
With Ringgold's spirit for the fray,
With Watson's blood at Monterey,
With fearless Lowe and dashing May,
Maryland, my Maryland !

Dear mother, burst the tyrant's chain,
Maryland !
Virginia should not call in vain,
Maryland !
She meets her sisters on the plain—
"Sic semper !" 'tis the proud refrain
That baffles minions back amain,
Maryland, my Maryland !

Come ! for thy shield is bright and strong,
Maryland !
Come ! for thy dalliance does thee wrong,
Maryland !
Come to thine own heroic throng
Stalking with Liberty along,
And chant thy dauntless slogan-song,
Maryland, my Maryland !

I saw the blush upon thy cheek,
Maryland !
For thou wast ever bravely meet,
Maryland !
But lo ! there surges forth a shriek,
From hill to hill, from creek to creek,
Potomac calls to Chesapeake,
Maryland, my Maryland !

Thou wilt not yield the Vandal toll,
Maryland !
Thou wilt not crook to his control,
Maryland !
Better a fire upon thee roll,
Better the shot, the blade, the bowl,
Than crucifixion of the soul,
Maryland, my Maryland !

Dear mother, burst the tyrant's chain,
Maryland !
Virginia should not call in vain,
Maryland !
She meets her sisters on the plain—
"Sic semper !" 'tis the proud refrain
That baffles minions back amain,
Maryland !
Arise in majesty again,
Maryland, my Maryland !

OLD MOTHER HUBBARD



She went to the hatter's
To buy him a hat,
And when she came back
He was feeding the cat.



She went to the barber's
To buy him a wig,
But when she came back
He was dancing a jig.

OLD Mother Hubbard
Went to the cupboard
To get her poor dog a bone;
But when she got there
The cupboard was bare,
And so the poor dog had none.



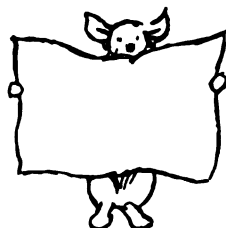
She went to the fruiterer's
To buy him some fruit,
But when she came back
He was playing the flute.

She went to the tailor's
To buy him a coat,
But when she came back
He was riding a goat.

She went to the baker's
To buy him some bread,
But when she came back
The poor dog was dead.



She went to the
cobbler's
To buy him some
shoes,
But when she came
back
He was reading
the news.



She went to the joiner's
To buy him a coffin.
But when she came back
The dog was laughing.

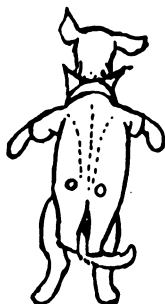


She took a clean dish
To get him some tripe,
But when she came back
He was smoking his pipe.

She went to the fishmonger's
To buy him some fish,
And when she came back
He was licking the dish.

She went to the sempster's
To buy him some linen,
But when she came back
The dog was spinning.

She went to the hosier's
To buy him some
hose,
But when she came back
He was dress'd in his
clothes.



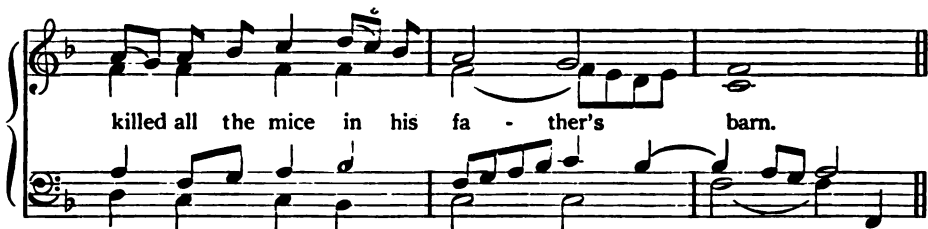
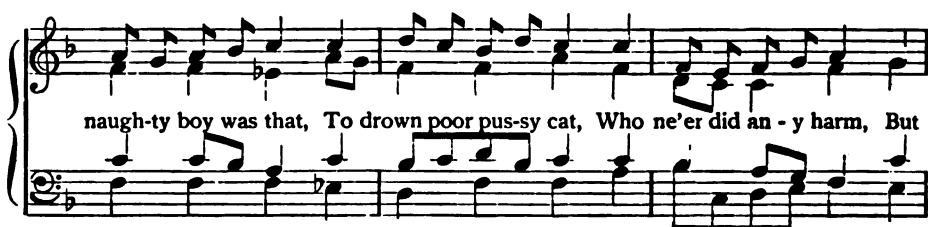
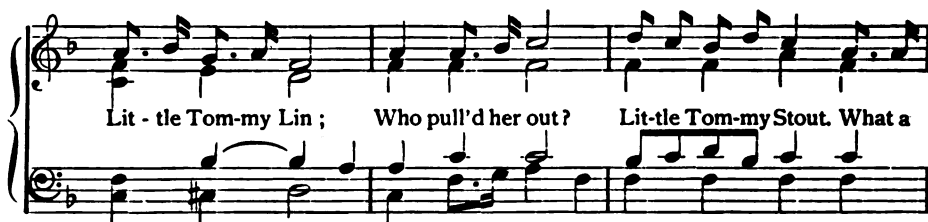
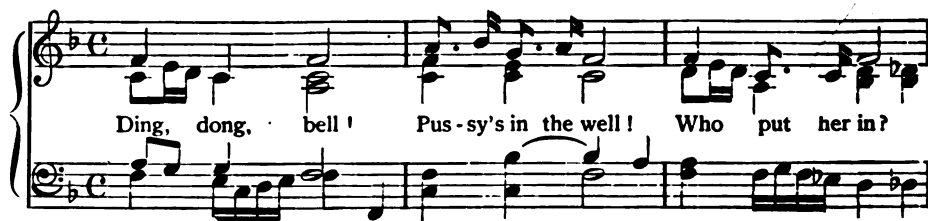
She went to the ale-house
To get him some beer,
But when she came back
The dog sat in a chair.



She went to the tavern
For white wine and red,
But when she came back
The dog stood on his head.

The dame made a curt-
sey,
The dog made a bow;
The dame said, "Your
servant,"
The dog said, "Bow-wow!"

DING, DONG, BELL !



JOHNNY shall have a new bonnet,
And Johnny shall go to the fair,
And Johnny shall have a blue ribbon
To tie up his bonnie brown hair.
And why may I not love Johnny ?
And why may not Johnny love me ?
And why may I not love Johnny,
As well as another body ?

And here's a leg for a stocking,
And here's a foot for a shoe,
And he has a kiss for his daddy,
And two for his mammy, I trow.
And why may I not love Johnny ?
And why may not Johnny love me ?
And why may I not love Johnny,
As well as another body ?

KING PIPPIN built a fine new hall,
Pastry and pie-crust were the wall ;
Windows made of black pudding and
white,
Slates were pancakes, you ne'er saw
the like.

SEE-SAW, sacaradown,
Which is the way to London Town ?
One foot up, and one foot down,
That is the way to London Town.

ONCE on a time I saw a bear
Who was dressing her daughter's hair.

Once on a time I saw a big rat,
And under his arm he carried his hat.



THE CHAIR THAT COMES TO YOU

ALMOST everybody has heard of mesmerism. If any boy who reads this page has not done so, it may be explained that it means a curious power possessed by some people of making other people obey their commands, even though it be to do something silly or ridiculous.

Such a power as that you are much better without; but we may learn here how to do something which seems to be even more surprising—namely, how to mesmerise a chair, and make it follow you about the room. You seem merely to place yourself in front of it, and wave your hands over it a few times with the same sort of movement that you make in swimming. When you consider the chair sufficiently “mesmerised,” you walk backwards, as in the picture, beckoning it to come to you; and it follows you accordingly. At any moment anyone may pick it up and examine it, but he will find nothing to account for its curious behaviour.

Of course, there is a trick about the matter, and, like many of the best tricks, it is absurdly simple when you know it. It all depends upon a piece of strong black silk thread, not attached to the chair in any way, but arranged in a very ingenious manner.

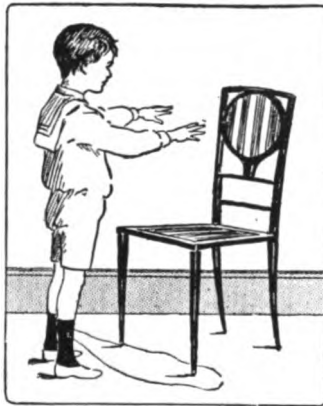
To prepare for the trick, take the thread, which should be about four feet long, and tie to each end of it a black pin bent into the form of a hook. You then hook one pin into the front of each stocking, if you are wearing knickers, just above the boot. If you wear trousers, the pins must be hooked into the front of each trousers-leg. The rest of the thread will lie on the carpet between your feet, and when you step backwards will form a sort of broad loop in front of you. By gaslight it will be invisible at a few feet distance, and if you are careful it will not interfere in the least with your moving about. The chair used must be of the very light drawing-room kind, and the more upright the legs are the better. If there is more than

CONTINUED FROM 2357

one such chair in the room, you should let the company decide which of them you shall use.

The choice having been made, you hold the chair upside down, and move it about freely, so as to let people see for themselves that there is nothing attached to it in any way. You then make a step backwards, and set it down facing you, but with one of its legs inside the loop formed by the thread, and begin to make your “mesmeric” passes as already described. You must be very serious over this. After a minute or so you say, “I should think it is now under the mesmeric influence. Chair, come to me!” At first nothing happens, so you mesmerise it a little more, and presently again say, “Chair, it is useless to resist my will. I command you! Come!”

As you say this you make a beckoning movement, and at the same time begin to move very slowly backwards. The drawing back of the foot tightens the thread, and this draws the chair with it.



“Mesmerising” the chair

You should not keep this up too long. When the chair has moved a foot or so, it is best—though still beckoning—to let it come to a standstill. Then you say, “I can’t make it come any further. The power is exhausted”—or something to that effect. You then again pick up the chair, free of the thread, and offer it to anybody who cares to examine it.

Simple though it is, this is a trick which requires a good deal of practice before it is performed in public. Not only do you thereby gain confidence, but in the course of your practice you will find out exactly what length of thread suits you best, and the most natural way of drawing back so as to compel the chair to follow you without giving away the secret.

A little powdered French chalk, rubbed beforehand on the end of each leg of the chair will make it slide easily over the carpet.

HOW TO MAKE A LITTLE WOOL MAT

A CANVAS rug mat, which is quite easy to make, can be used to go under the piano or the writing-table, or, if we like to make a tiny one, it will do for a doll's baby carriage or a toy motor-car.

Let us make, for a first attempt, quite a small mat, say, one measuring thirty inches in length and twelve inches in width. One advantage in letting the mat be twelve inches wide is that a canvas that width can be bought at so much a yard, so that all we have to do is to cut off thirty-one inches from the yard length; the extra inch is to allow for folding over half an inch for tacking at each end.

These folds need stitching down securely, because the canvas is stiff and springy, and the rough edge ravels easily.

The next point to decide is the kind and quantity of wool. Girls and boys who are good at reckoning will find the canvas for our mat has two and a half square feet in it, and we shall want about three-quarters of a pound, or 12 ounces of twisted cable rug wool at about 50 cents a pound for each square foot of canvas. Sums in carpeting and papering are sometimes dry, uninteresting things to do, but we are going to find a carpet sum useful in planning our own mat. Have you found how much wool we shall want? Nearly two pounds, is it not? Then we will buy two pounds, for the small quantity left over will be certain to come in useful when making another mat.

But we do not want all the wool to be of the same colour. Our rug must have a border round it of another shade. Suppose we buy three-quarters of a pound of red wool for the centre, and the remaining one and a quarter pounds of black wool for the border.

We shall need a wood gauge, costing a few cents or a strip of cardboard for measuring off lengths of wool, because it is necessary to have all the little pieces of wool for the mat exactly the same length. We also want a rather large wooden crochet hook, and to line the mat when finished we shall need half a yard of some dark material such as black linen. A suitable kind is

sold at most dry goods stores usually measuring forty inches in width.

Having got together the materials, we set about planning our mat. Look at picture 1.

With a pencil or piece of chalk we mark the border on the canvas at the same distance from the edge—three inches all the way round, so that the central part measures twenty-four inches by six.

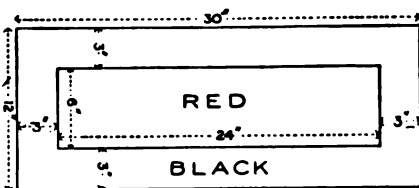
Next, we take the black wool and wind it round the gauge or piece of cardboard—about four inches long—winding evenly, but not straining the wool. Then we cut along the groove in the gauge, or along the end of the cardboard.

With the canvas before us on our knees, and the right side uppermost, we take up a piece of the black wool, untwist the two strands, and, doubling one of them in halves, apply the loop with the fingers of the left hand to the hole in the right top corner of the canvas. With the crochet hook in the right hand we pull the loop down through the hole and up through the next hole to the right. Still keeping the hook in the loop of wool, we next draw the two ends of the wool through the loop so that they stand up from the canvas erect. This is quite easy to do, though it takes many words to tell how it is done—*a* and *b* in picture 2 show the hook through the hole; *c*, the ends being caught by the hook; and *d*, the ends on the point of being pulled through the loop. We tighten and adjust the ends with the fingers; then we take up the other strand of the split wool and fasten it in through the next hole.

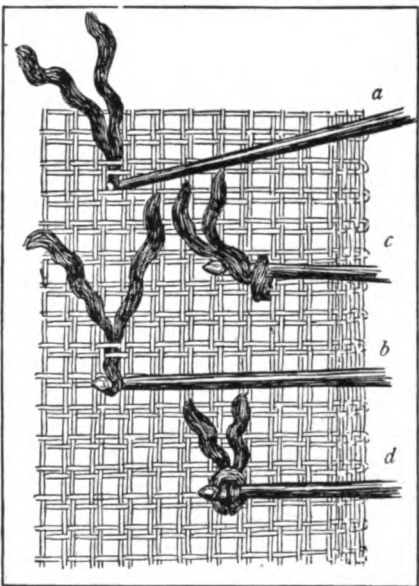
We proceed with the same wool along the edge of the canvas until we have filled the rows of holes three inches deep. Now, continuing with the black wool at the beginning and end of the row only, we fill the middle part of it with

the red wool. We go on filling up the rows like this until we reach the beginning of the three-inch border along the second side, and from that row continue with the black wool only.

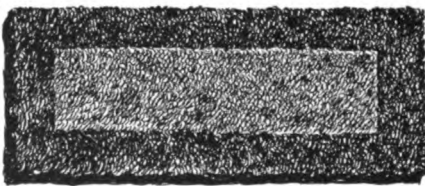
If at any point we find the wool getting too thick and close together, the best thing



1. The measurements for the mat



2. Pulling the wool through the canvas



3. The little wool mat finished

to do is to leave a hole empty of wool. We have chosen black for the border and red for the centre, but twisted rug wool is made in many colours, and there is a large choice of reds, yellows, blues, browns, and greens. We should, of course, think of the colour of the carpet when choosing the colours for the mat, and let them match or blend with that.

Having filled the canvas, we now look it over carefully, give the rug a good shake, see that the strands of wool are all the same length, and cut even with the rest any that stand out.

Now we must see about lining the mat with the black linen. This is first cut to the shape of the mat, the edges are turned in, and it is laid, glazed side out, on the back of the mat. It is then sewn neatly and evenly with strong thread round the edge of the canvas. We must be careful to press the wool quite away with the left hand while we are sewing, or we may possibly catch it in the thread.

For the little mat which we have been making we have been splitting the twisted cable rug wool into two strands. If we wanted a heavy mat with very thick pile, we could leave it untwisted. In this case we use the same quantity of wool, but work into every other hole of the canvas. Jaffa rug wool at about 40 cents a pound is also used for rug work. It is composed of six fine strands instead of two thick ones as was the case with the wool used in making our mat.

All kinds of pretty patterns are possible in canvas work, and even a patchwork mat of odds and ends left over from previous mats may look very well. But it is unwise to attempt very complicated patterns at first. Having once made a mat to our satisfaction, it will be easy to make another much bigger, which might be used for a carriage rug, a hearth rug, or perhaps for a footstool cover.

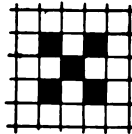
WHAT TO DO WITH A CHEAP EXERCISE BOOK

If we get a cheap exercise book ruled in squares, which can be bought at any stationer's store, we shall be able to make all the pictures on this page and many others which we can invent for ourselves. All we have to do is to fill in the squares with crayons or black lead pencil or different coloured inks. Let us begin with a simple pattern like the first picture on this page, and try to copy it very neatly and care-

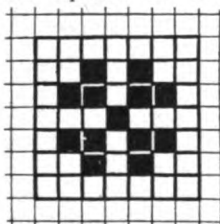
fully. We must begin at the top and count the squares as we of patterns like this, and then we can try something more difficult like the patterns shown in our second and fourth pictures. The second is like a tiled wall, and the fourth like the floor of a church. Now let us try something more difficult still, and at the same time more interesting, like the flag in picture No. 5. In order to get the cross at the top left-hand corner, we have to treat the squares there a

little differently, but the picture shows us clearly

fully. We must begin at the top and count the squares as we



1. An easy pattern



2. A tiled wall

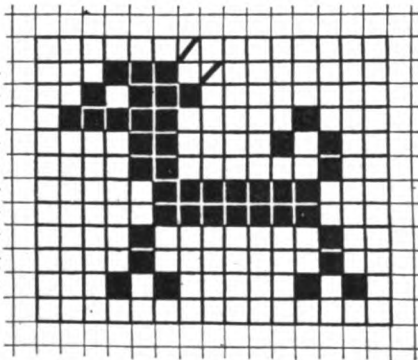
colour them in. Let us take the first line.

We will make up our mind where we are

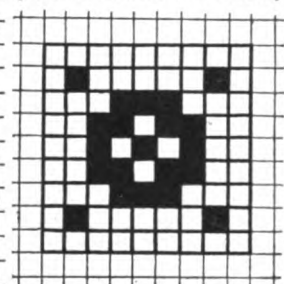
going to start in the exercise book and then, as we do the first square, say "make a square," then "miss a square," then "make a square." This gives us our first line. Now between the two squares that have been filled in in the first line we colour a square in the second line, and after this is done the third line can be done in the same way as the first. Thus we have our first sample pattern.

If we have crayons, or coloured pencils or inks, we can make the middle square red and the others blue or green or yellow.

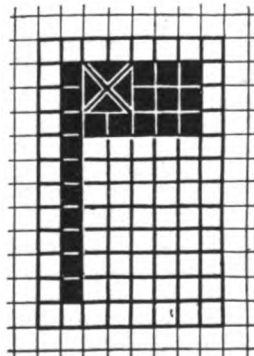
If we like, we can make a row



3. A little dog running



4. An inlaid church floor



5. A flag and staff

how to do this. And now, having had so much practice, we can begin to make all kinds of pictures, animals, birds, flowers, engines, houses, castles, and so on. The little dog which is shown in the third picture on this page shows us how to make curves and bends like those of the tail and legs.

When you have learnt to do these in pencil, buy at any toy store some sheets of *pricked* paper. You will find tiny holes pierced in the corners of the squares, and you can make these same patterns in silk crosses with the aid of a needle by taking the thread in and out of the paper from corner to corner of each square.

THE WIZARD'S POCKET-HANDKERCHIEF

ON page 1347 we learn how to "lose" a coin from a handkerchief. In this case a coin is likewise made to disappear, but after quite a different fashion. The handkerchief used is a coloured one, and the wizard's own property. We will suppose that

the trick is to be performed with a quarter. The conjurer gathers up the four corners of the handkerchief, as in picture 1, and has the quarter dropped into the sort of bag thus formed. He proves that the coin is really there by making it chink against the table-top, or allowing somebody to feel it through the handkerchief. But presently he says: "Quarter, vanish!" or something to the same effect, and the coin forthwith departs. The handkerchief is shaken out, but nothing falls. But the performer explains that the coin has merely stepped round the corner, and will come back again if desired. Again he gathers up the four corners of the handkerchief and says: "Quarter, come back." Again he makes it chink upon the table, and allows anybody to feel that it has really returned. He now says: "Quarter, pass into that vase upon the sideboard," or any other place he likes to mention. Once more the coin has disappeared, and is found where he has told the audience that it would go. The secret here lies in the handkerchief, which is one that has been specially prepared for the purpose of the deception. If the young reader is a boy, he will have to get the assistance of some relative—a sister, a cousin, or an aunt—to make it; if a girl, she can do the needful work for herself.

The pattern of the cloth of which the handkerchief is made does not matter, but it must be double, being in fact two handkerchiefs of the same pattern sewn together all round the edges, save for one small opening. This is at the corner *B* in picture 2, where for a space of an inch and a half each way the two handkerchiefs are not joined together. This leaves a space between the two handkerchiefs, and this space is the secret of the trick. The two handkerchiefs must also be joined together by a diagonal line of stitching from the bottom of the opening at *B* to a point an inch short of the *C* corner. As it is important that this line of stitching should not be noticeable, the handkerchiefs used must be somewhat dark in colour, and the more intricate the design the better it is.

When it is proposed to show the trick, the first step is to hide a quarter beforehand in some convenient place, to be found there when necessary afterwards. The handkerchief must be held in the first instance spread out four-square, the corner *A* between the



1. The handkerchief held by the four corners so as to form a bag

thumb and fingers of the left hand, and the corner *B* between those of the right, but with the little mouth at *B* kept open by inserting the tip of the forefinger in it. The performer then gathers up the other corners one by one into this same hand, forming a sort of bag, as in picture 1. He then asks someone to lend him a quarter, and to drop it himself into the bag thus formed, in reality offering him the opening at *B*, so that the coin actually falls into the space between the two handkerchiefs. To avoid mistake, it is well, for the moment, to hook both forefingers into the opening. The coin may now be made to rap upon the table, or be felt through the handkerchief. This done, the performer lets loose the corners *C* and *D*, but nothing falls, the quarter running down the line of stitching to *C*. By again picking up the four corners, the coin is brought back to the centre.



2. The secret of the magic handkerchief

The performer now orders the quarter to go to the spot where he has placed the duplicate coin, and once again shakes out the handkerchief four-square. He then drops the corner *A*, and with the left hand takes hold of the corner *C*, holding the handkerchief straight up and down, and giving it a shake as if to call attention more forcibly to its entire emptiness. While the attention of the spectators is occupied in seeing whether the quarter has reached the place named, he works the first coin through the opening into the left hand and gets rid of it.

If you perform the trick neatly, you may be asked to do it again, but it is seldom wise to do a trick twice over before the same spectators. Should anyone press for an *encore*, your best plan is to exhibit instead some trick more or less resembling the first one. In the present case, the disappearance of the quarter makes a capital introduction to that of a coin, as described on page 1347. You agree to "do it again"; and this time you say you will use another coin and somebody else's pocket-handkerchief. You keep your word—that is, you again lose a coin from a handkerchief; and the trick being the same *in effect*, the audience does not realise that it is really quite a different one.

HOW DID THE FATHER DIVIDE HIS GARDEN?

A GENTLEMAN, who was a merchant in the city of London, decided to live a little way out in the country, where he could have a larger garden than could be obtained in town. So after looking about for some time he found a very nice house with a fine garden, and the house stood on one quarter of the ground as seen in our birdseye view of the place. After taking his wife to see the house, the merchant bought it, and soon moved with his family to the new home. Now, this gentleman had two sons named Harry and Leslie, and two daughters, Doris and Gertrude, and they were all very fond of gardening. They at once asked their father to divide the garden up among them, and to allow them to cultivate it, and when the summer came they would see



whose particular part had the best show of flowers. The father readily agreed, for he knew that his children would do their best, and this arrangement would save him the trouble and expense of engaging a gardener. Besides, it would provide plenty of healthy recreation for their spare time, and so he said he would divide the garden up into four parts of equal size and shape, and give one to each. The boys and girls could not see how their father would be able to do this, because the garden was already such an awkward shape that it did not seem at all an easy matter to divide it as he said. But the gentleman did it, and the boys and girls agreed that it was really very simple after all. How was the garden divided as the father promised?

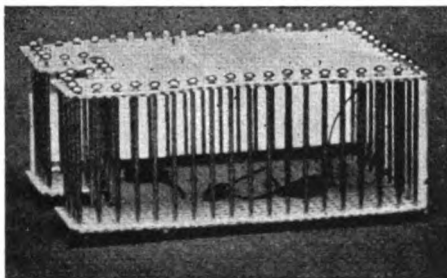
A CAGE MADE OF CARDBOARD AND PINS

THE little cage of mice shown in the picture is made of cardboard and pins, and costs a good deal less than a dime.

First we buy a large sheet of perforated cardboard. A store which supplies kindergarten goods will sell us this. Then we cut out of this sheet two pieces, each measuring two and a quarter inches long and two inches wide.

We want some large brown apple-pips, which we can save from the next apple we eat.

We choose a rather fine needle, thread it with black cotton and pass it through a pip, beginning at the narrow end, and leaving a piece sticking out to form the tail. We then pass the needle down through a hole in one of



the pieces of cardboard, stitch down the tail where it joins the body, and secure the cotton on the under-side of the card. Two or three more mice are dotted about the card in the same way. Next we get some bright new pins

to fit the holes in the card without slipping out, and these we run through the holes along the edge of the second piece of card. A notch at the end imitates the door in the cage, as seen in the picture; and the pins follow round the edge of the notched part. We press the pin down so that its head lies close to the card.

Then we put the point of the pin into the corresponding hole in the card with the mice in, and this forms the floor of the cage.

HOW THE MAGIC SQUARE WAS MADE

A STUDY of the two illustrations given here shows how the figured square, shown on page 2350, was cut up and put together again in a different way, so that it became a magic square—that is to say, a square, each column, horizontal row, and diagonal of which, when added up, gives the same result.

The first picture shows the original square cut into four pieces, one piece containing two

figured spaces, another piece four figured spaces, and the remaining two pieces each

1	15	5	12
8	10	4	9
11	6	16	2
14	3	13	7

1	11	6	16
8	14	3	9
15	5	12	2
10	4	13	7

containing five figured spaces. The second picture shows these four pieces arranged in a new and magic order. It will be found that every column in this arrangement makes 34 when added up, and that every horizontal row and each of the two diagonals give the same result, thus forming a magic square.

WHAT SCENE IN HISTORY IS THIS?

THE GAME OF "WHAT IS IT?"

HERE are some puzzle games to be played sitting round the fire, similar to those which appeared on page 2356. Below are descriptions of famous scenes in history. The solutions will be found on page 2570.

AN ANGRY SCENE IN A TENT

1. We are in a tent in a meadow by the bank of a river. In the tent are gathered a number of men armed after the fashion of the Middle Ages, and through the opening of the tent we see troops standing. The men in the tent look angry and determined, and bend threatening looks on one who is the centre of attention, and wears a crown. The foremost man of the group is urging him to put his sign to a document spread out on a table before him. At last he consents, sets his seal on a lump of wax and throws himself on the ground in a rage. Who is he, and what is the deed that he has been forced to do by others and now so very much regrets?

THE LANDING OF A BRAVE BAND

2. We are on the coast of a wild, uncultivated country. Behind the bare rock on which we stand, forest stretches away inland. Off the shore is a small bark at anchor, and from it we watch men, women, and children landing. They are dressed in plain garments, and seem to belong to the artisan class. They are evidently weary, yet how brave they must be to cross that wild sea in their small boat of 180 tons, and land with their little children on an unknown shore. Who are they, and why have they come here, where there is neither shelter nor food ready for them?

THE ROBBER AND THE LITTLE PRINCE

3. It is a time of anxiety and danger. All the countryside is disturbed by war. A battle has just been fought, and in the forest, near the battlefield, a mother and her boy have sought refuge. While wandering about hoping to escape notice, some robbers discover the mother and her little son, and take from them their money, jewellery, and food, and then leave them. It is April. The trees are leafless, and the poor mother is anxious for her boy, who has been reared in the comfort of palaces. While seated on a tree-trunk, she hears a footstep on the dry leaves, and, fearing it is another robber, her heart fails her. Then she thinks of her boy, who should one day be king of England. She rises and faces the new-comer, who is indeed a robber, but her pleadings rouse the pity of the man, who promises to take her and her boy safely to the coast, so that they may be able to escape to France. What incident

is this, and does the robber keep the promise that he has made to take them to the coast?

THE WRITING ON THE CHURCH DOOR

4. Before us is a heavy church door studded with nails. A monk advances from the street holding a paper in his hands. He has a look of stern determination, and walks straight up to the church door. Now we can see that the paper is covered with writing. The monk takes from a bag a hammer and some nails, and fastens the document on to the door; then he stands aside to watch the result. Some townsmen have been watching him, and curiosity prompts them to see what the daring monk has nailed to the church door. Three years later, at the gate of the castle near by, the same bold monk burned in a bonfire another document, while the people stood round in a crowd and watched him. Who was the monk, and what were the documents?

AN INTERRUPTED GAME OF BOWLS

5. We have before us a bowling green, where men are intent on their play. Near by stands a man gazing out to sea across the harbour. He pays no attention to the game, but stands shading his eyes from the sun with his hands. Suddenly he sees something, for he turns, and, striding up to one of the players, eagerly points out to him the beacon being lighted close by. But to his surprise the player goes on with his game of bowls, coolly remarking: "There is plenty of time to finish the game and beat the Spaniards too." Yet, all around, people are gazing out across the harbour, or making hurried preparations. Evidently some great event is about to take place, and all the men look determined though anxious. What incident is this?

THE GREAT MAN ON A LITTLE ISLAND

6. We are on a small island, only about 86 square miles in extent, in the blue waters of the Mediterranean and within sight of the coast, where fishermen and iron-miners live. Before us is a large building, and through one of the windows we see a man seated at a table. He looks sullen and unhappy, as though he were brooding over his misfortunes, for he has fallen from greatness. Yet the power that he had was not used to help mankind; rather was it used to overreach others and subdue them to his will. No wonder he is unhappy and looks miserable! Sitting there in gloomy thought, he plots how he will escape from this island, which was given to him as his dominion, because it was thought he could there do no further mischief. Who is the man described here?

THE ANSWERS TO THE GAME OF WHERE IS IT, ON PAGE 2356

ON page 2356 are some descriptions of places to be guessed. These are the places: 1. Benares, India. 2. St. Petersburg. 3. Upper Burma. 4. Cape Town. 5. Plymouth Hoe, England. 6. Canadian Pacific Railway in Manitoba. 7. Tahiti, Society Islands, Pacific Ocean.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 2563



A Volcano in the Southern Seas

A HEROINE OF THE SOUTHERN SEAS

FAR away in the Pacific Ocean are the Hawaiian Islands, for the most part formed of coral, but with lofty volcanic mountains in their midst

CONTINUED FROM 2478

One of these is named Kilauea, and is one of the largest and most terrible volcanoes in the world. Its enormous crater contains a lake of liquid fire, from six to nine miles round, and the smoke of it rises like a cloud by day and night. The natives used to believe that amid the fire there dwelt a fierce goddess named Pe-le, whose bath was in the mighty crater, and whose hair was supposed to be the glassy threads that covered the hills. Everyone stood in awe of Pe-le, but especially women.

The priests said that if a woman climbed the mountain, picked berries from the bushes and flung them into the lake of fire, the goddess would "shake with her thunders, and shatter her island."

But a hundred years ago Christian missionaries came to the island, and gradually the people gave up their faith in the fierce and savage deities they had worshipped, and began to serve the one true Maker of heaven and earth. Only, the fear of Pe-le was still upon them, and her flaming mountain was the heathen stronghold.

Then it was that a brave Christian woman, strong in faith and courage, resolved to defy the goddess in her

fastness, and break the spell that bound the people. Her name

was Kapiolani, and she was the wife of Naihe, the public orator of Hawaii. This was in 1825.

One day she plucked a branch of the sacred berries, which it was sacrilege for a woman to touch, and started to climb the mountain. It was a toilsome and terrible ascent of two and a half miles; very dangerous, too when she reached the slippery sheets of lava and the slopes of crumbling cinders.

The enraged priests of Pe-le came out of their sanctuary among the crags, and tried to bar her way with threats, but she heeded them not. She pressed on to the summit, and then clambered down the side of the terrible crater, till she stood on the brink of the boiling sea of fire.

Then she hurled into it the sacred berries, with the words:

"If I perish by the anger of Pe-le, then dread is her power; but behold, I defy her wrath! I have broken her orders; I live and am safe, for Jehovah the Almighty is my God. His was the breath that kindled these flames; His is the hand which restrains their fury. Oh, ye people, behold how vain are the gods of Hawaii, and serve the Lord!"

Safely Kapiolani descended the mountain, having broken the power of superstition by her brave deed, and won her cause of faith and freedom.

THE PRINCESS WHO BECAME A GOOSE GIRL

A BEAUTIFUL Princess was to be married to a Prince whom she had never seen.

All preparations were made for the wedding, and the time came when the Princess had to bid farewell to her mother. The Queen was very sad at this parting, for the Prince's kingdom was so far away that she might never see her daughter again.

As they were saying good-bye, the Queen pricked her finger so that three drops of blood fell on to her handkerchief. Giving it to her daughter, she said:

"Carry this with you wherever you go, and no harm can ever befall you."

Princess began to feel very thirsty.

"Please fetch me some water from the brook," she said to the maid.

But the maid answered rudely:

"I shall not. Get it yourself."

The Princess made no reply, but alighted from her horse, drew the water, and rode on again. And the handkerchief said:

"If your mother knew, it would break her heart."

By-and-by the Princess said again:

"I am thirsty. Please fetch me some water."

But the maid answered:

"You may fetch it yourself. I am not going to be your maid."

Again the Princess made no reply, but alighted from her horse and drew the water. And the handkerchief said:

"If your mother knew, it would break her heart."

The Princess wept, and the handkerchief fell out into the brook.

Then the maid, who knew that the handkerchief could no longer protect her mistress, said:

"Give me your dress, and take mine. We will change places. Take my horse, and I will take your horse, Falada. I will marry the Prince, and everyone must think that I am the Princess. If you refuse, I will kill you."

The Princess was so terrified that, to save her life, she consented, and they rode on. Presently they came to the palace, and the maid was treated as the Princess, and the Princess as the maid. As the poor Princess stood, sad and alone, in the yard, the King looked out of the window, and saw her.

"Do you want work?"

he asked kindly.

"Yes, please," answered the Princess.

"I want a girl to help my lad, Kurdchen, to mind the geese," said the



The Princess became a goose girl, and spent her days tending the geese.

The Princess thought this strange, but she obeyed, and soon set out with her maid to the land where the Prince lived. Before they had gone far the

King, "and if you would like to stay here you may be my little goose girl."

And so the Princess became a goose girl, and spent her days with Kurdchen, tending the geese.

Now, the wicked maid was frightened that the horse Falada might tell the King all that had happened, so she ordered his head to be cut off. But the Princess loved Falada, and she persuaded Kurdchen to hang its head over the kitchen door, and every day as she went out she would say to it:

"Do you know who I am, Falada?"

And the head would answer her:

"You are the Princess. If your mother knew, it would break her heart."

One day the Princess let her golden hair down while Kurdchen was by. The lad was so struck with its beauty that he wanted to cut off a lock for himself. But the Princess refused, and this made him so angry that he ran to the King and told him that she was a witch.

When the King heard the story of the talking head that hung over the door and the goose girl's beautiful golden hair, he wondered what it all meant. The next day he sent for her.

The Princess entered the palace and appeared before the King, who was so impressed with her beauty and grace that he asked:

"Who are you?"

"Alas! I dare not say," she replied.

"I have sworn to tell no one, and if I break my word I shall be killed."

Then the King said:

"I am the King of all this land. No one shall hurt you. Tell me all, and I will protect you."

The Princess burst into tears.

"I am the real Princess who was to marry your son, the Prince," she said.

"But my maid took away my dress

and my horse because she wished to marry him herself, and she threatened to kill me if I told anyone. If my mother knew, it would break her heart."



Kurdchen ran to the King to tell him that the Princess was a witch.

"Do not be afraid," said the King, who knew at once that this was really the true Princess.

The King comforted her, had her dressed in royal robes and sent for the Prince. She looked so beautiful and happy that the Prince immediately fell in love with her, and they were married that very day. A great feast was prepared, to which all the people of the Court were invited, and there was much rejoicing and merry-making, because the true Princess had married the Prince. The wicked maid was severely punished, as she well deserved, and banished from the country, and the Prince and Princess lived happily ever after.

THE CAT AND THE PARROT

MADAME THÉOPHILE was a sandy cat of whom a French writer, Théophile Gautier, tells us this charming story :

She had a white chest, a pink nose, and blue eyes ; she was called Madame Théophile because she dwelt with me on the most friendly terms, sleeping at the foot of my bed, dreaming on the arm of my chair while I wrote, descending to the garden to follow me in my walks, assisting at my meals, sometimes even intercepting a morsel of food which I might be carrying on my fork to my mouth.

One day a friend of mine, who was going away for a few days, confided to my care his parrot. The bird, feeling himself transported to a strange land, climbed by means of his beak to the top of his perch, and, sitting there silent and trembling, rolled around him eyes full of alarm.

Madame Théophile had never seen a parrot, and this creature, so new to her, evidently caused her immense surprise. As motionless as an embalmed cat from Egypt, she regarded the bird with an air of profound meditation, putting together all the notions of natural history which she had been able to gather on the tiles, in the courtyard, and the garden. The shadow of her thoughts passed across her blinking eyes, and I could read there, quite as well as if she had spoken out with her voice, this summing up of her examination :

"Decidedly this strange creature cannot be a green fowl."

Arrived at this decision, the cat got down from the table where she had established her observatory, and went and crouched in a corner of the room, stomach on the ground, the elbows protruded, the head low, the spring of the spine extended—like a cunning panther watching gazelles who have come from their homes to quench their thirst at a lake.

The parrot followed these movements with a feverish anxiety ; he bristled his feathers, rattled his chain, lifted an agitated foot, and sharpened his beak on the edge of his feeding-tin. Instinct told him that an enemy was contemplating some kind of wickedness.

As for the eyes of the cat, fixed upon the bird with a fascinated intensity, they said, in a language which the parrot perfectly well understood, and which had nothing in the least uncertain about it : "Although green, this chicken ought to be good eating."

I followed this scene with interest, ready to interfere when occasion called. Madame Théophile had drawn nearer to the parrot ; her pink nose quivered, she half closed her eyes, opened and shut her claws. Little thrills ran up and down her spine ; like a greedy man sitting down before a delicious truffled pullet, she delighted herself with the thought of the succulent and rare meal which she was about to make. This foreign dish, so new to her and yet so tempting, tickled her appetite.

Suddenly her back bent like a stretched bow, and one elastic jump took her to the foot of the perch. The parrot, realising his danger, with a voice low and solemn, said suddenly :

"Have you breakfasted, James ?"

This phrase caused the cat an indescribable terror, and she sprang back. A flourish of trumpets, a smash of plates and dishes, a pistol fired at the ear, could not have given her a more frantic terror. All her ideas of birds were reversed. Her face expressed clearly the staggering thought that had suddenly come to her :

"This is not a bird ; this is a gentleman. He speaks !"

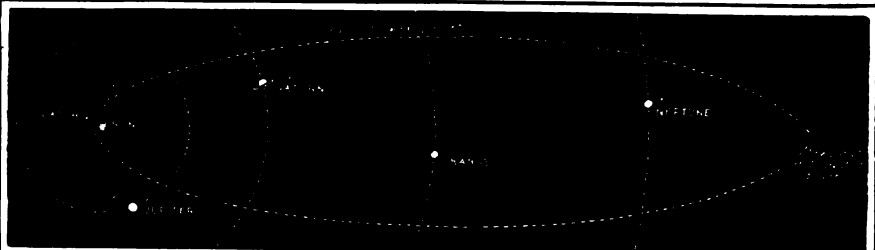
Then the parrot began to sing, with a great shout in his voice which was perfectly deafening, for he had realised that the fright caused by his speech was his best means of defence.

The cat threw towards me a hurried glance of interrogation, and, my reply not satisfying her, she buried herself under the bed, from which it was impossible to make her move an inch all the day long.

Next day, a little more courageous, Madame Théophile ventured to make another timid attack, but with the same fortune as had met her the last time.

From that moment she threw up the sponge, accepting the green bird as a man who must be treated with respect.

THE NEXT STORIES BEGIN ON PAGE 2601



Halley's comet is a part of the solar system and travels round the sun. The sun, however, is not the centre of this comet's path, but is at one end, as shown here. The comet returns within our sight about every seventy-five years, and then rushes away until it is 3,200 millions of miles from the sun.

COMETS, METEORS, AND SKYDUST

Most people have got into the way of thinking that space is quite empty between the stars, and that the solar system is quite empty between the planets; and so we speak of "empty space." We do not, of course, mean really empty, but we mean empty of everything but the ether, which is everywhere. But now we are beginning to learn that space is by no means so thinly inhabited as we used to think.

It is probable that if we could travel from the earth to Mars we should find ourselves almost constantly encountering matter of one kind and another, and so, in order to complete our study of the solar system, we must take into account various things which are part of it, but which are very different from either the sun, or the planets, or the moons of the planets. The most remarkable are the comets. After studying them we must learn about the meteors, and also about the dusty stuff which exists in space, and is usually known to astronomers as cosmic dust. But the great point we are to be certain of, from the first, is that these different things are not quite independent of each other, but that if we could trace the history of a speck of matter from age to age we should probably find it at one time making part of a comet, at another time part of a meteor, and perhaps, last of all, as part of the cosmic dust or sky dust, about which astronomers are just beginning to learn.

Let us now begin with the comets. It is generally supposed that there

CONTINUED FROM 2499



are two classes of comets—those which go regularly round the sun, just as we do, and those which visit the sun, apparently once only, and then fly away for ever into the depths of space from which they came. We may possibly learn soon, however, that in reality even these last comets will return; and all we can say at present is that the more we study the comets, the more likely does it appear that all the comets we can see will some day be proved to be parts of the solar system, going round the sun as the earth does.


When we look at an ordinary comet, we may perhaps see only something bright, which might, for all we know, be simply a star. But if the comet is large and very near, or if we look at it through a telescope, we see at once that it is not a star. There is no mistaking it for anything but what it is, for no planet or star or moon or nebula has the same appearance.

The pictures on page 2499 show us that a comet has three parts; it has a head with a very bright spot in the centre, and around it a sort of cloud which perhaps looks a little like glowing hair. The word comet is derived from the Greek word *kome*, which means hair. The central and brightest part of the comet is called the nucleus—a word which we may remember because it is also the name for the central part of a living cell. A comet always has a nucleus with the misty stuff round it, and there is no doubt that this stuff is given out

from the nucleus, which is a very hot and very active place—at any rate, when the comet is near the sun.

The thing we always think of, however, in connection with a comet is its tail; and it is true that most comets, when we can see them, have tails. The tail may be long or short; it may be a single tail, or it may break up into a sort of brush. If we watch a comet that has several tails, we may find them changing very much, almost from day to day; sometimes they may disappear, and then after a while new tails, or a new tail, will form.

HOW THE SUN DRIVES THE COMET'S TAIL OUT OF ITS HEAD

We are at last beginning to understand what the tail of a comet is. It is best thought of as a streamer, or a number of streamers, flowing out from a head; and we shall have the key to the making of the comet's tail if we study its history in the various stages of a comet's course. The rule is that when a comet is far from the sun it has no tail. The path of a comet round the sun is much more elliptical—like this —than that of any planet, and at its farthest from the sun the comet goes out far beyond Neptune. Suppose, now, that we on the earth are watching a comet coming back towards the sun after its long journey into the cold. We know it for a comet by the appearance of its head and by its movement, and perhaps by the fact that it was expected. But when we first see it, it has no tail; then gradually, as it approaches the sun, a tail streams out behind it, and the nearer it is to the sun the bigger is the tail. At last the time comes when the comet has to go round the sun, and then it will begin to go back to the depths of the space from which it has come. At this time it is moving very quickly, for if it were not the sun would certainly capture it altogether by the force of gravitation.

THE COMET LEAVES THE SUN LIKE A LADY LEAVING ROYALTY

And now we notice that the tail of the comet, which streamed behind it as it approached the sun, is always seen on the side of the comet away from the sun; and as the comet leaves the sun, the tail is now the leading part of the comet. The comet leaves the sun like a lady leaving the presence of

Royalty—the train of her dress going first, and then the lady herself.

Now, all this plainly means that the tail is something which is pushed out from the head of the comet by the sun, so that, wherever the comet is in relation to the sun, whether it is going towards the sun or away from the sun, the part of the comet next the sun is always the head, and the part of the comet farthest from the sun is always the tail. There is some power in the sun which is able to repel part of the comet when the comet comes near enough. That part which is repelled or pushed back from a comet's head by the sun is the tail. That is why the tail only appears when the comet is near the sun, and that is why the tail behaves in the peculiar way it does.

We are to think of a comet's tail as made under the action of two forces. First, there is the nucleus of the comet which is throwing light stuff out from itself. If the comet is far from the sun, that stuff is made very slowly, and simply surrounds the nucleus, forming a sort of fog or hair, which gives the comet its name.

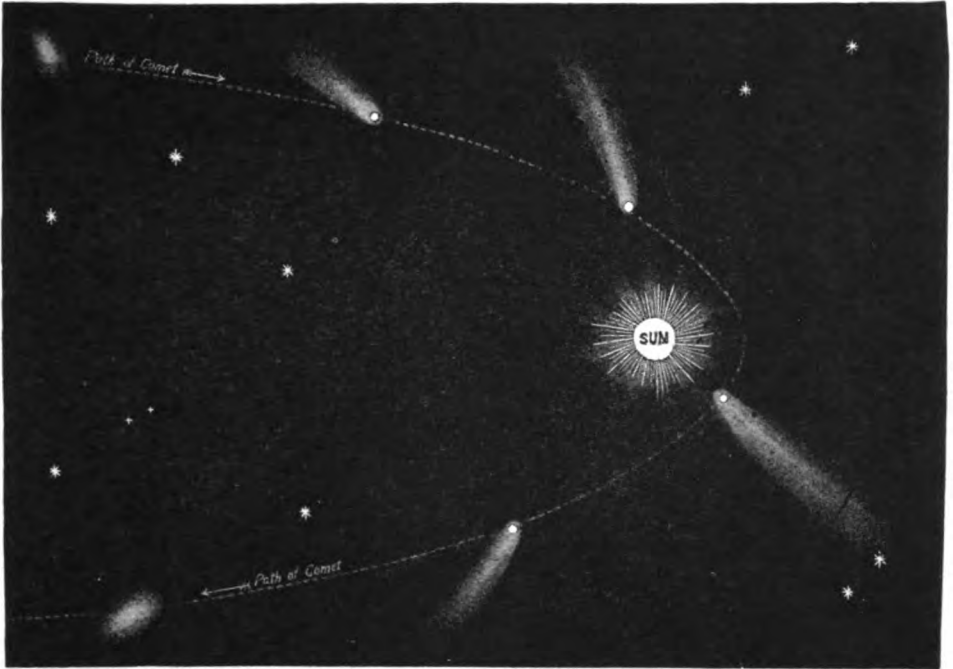
HOW THE COMET LOSES ITS TAIL AND HOW A NEW ONE COMES

But when the comet is near the sun, a second force comes into play, and the matter which is thrown out from the nucleus is now pushed by the sun, always on to the side of the comet farthest from the sun. There was discovered in America in 1908 a very fine comet, which was very carefully photographed again and again at Greenwich, and these photographs have shown more clearly than ever before the truth of what has just been said about a comet's tail. A specially interesting point is that the nucleus of a comet is not equally active at all times, but undergoes changes, just as volcanoes do, and just as the history of sun-spots shows us that the sun himself does. It may even be that the nucleus of a comet becomes regularly more and less active owing to a *cycle* of changes—we now know what that word means—going on inside it. Thus the appearance of a comet may change from day to day or week to week, and as it is certain that a comet's tail may sometimes get broken off, and scattered into space, days may pass during which the comet seems to have lost its tail, because,

perhaps, just then the nucleus is not throwing off much new matter; and then a new tail will "grow." That is to say, the nucleus starts exploding again, and the repelling power of the sun drives the exploded stuff out into a streamer, which we call the comet's tail.

Now, we have heard again and again of the attractive force of the sun, which we call gravitation, and suddenly we

of comets, and explains why the tail appears when the comet gets near the sun, and why it is always on the side away from the sun. We believe that it is the very lightest atoms in the comet that are pressed or blown away by the light from the sun. We need not say more about that here, but I particularly want you to remember that sometimes the matter which is blown out from



When a comet first comes within sight of the earth it appears as a patch of light. Then, as it gets nearer to the sun, it begins to have a tail, or stream of light, which is always turned away from the sun. This picture shows a comet travelling round the sun, and we can see how it appears at different stages of its journey. As it goes away from the sun it pushes its train backwards, like a lady leaving the presence of Royalty.

are told that the sun has a repelling force—something which acts in exactly the opposite direction to its force of attraction. I am sure that if you are thinking carefully you will say that there has been some mistake, or if there has been no mistake there is, at any rate, something which needs to be explained. Now, it has lately been shown that light, as it flies out from anywhere, has a pushing power, and it is possible, by a very delicate experiment, to show that a flash of light will push down one end of a balance. Not only light, but other kinds of rays, such as heat rays, have this power of pushing or pressing, and so it is called "radiation pressure." It is this light-pressure, or radiation pressure, that makes the tails

a comet's head may break away from the comet altogether. This has long been suspected, but I do not think that it had been proved until the photographs were taken at Greenwich in 1908, which showed that it actually happens. *We shall hear again of these broken-off pieces.*

By far the most famous of all comets is one which is known by the name of the great astronomer Halley. A comet had been seen by Kepler in 1607, and a comet which Halley saw in 1682 seemed to be in the same position. Halley argued that it must be the same comet, travelling round the sun once in every seventy-five years, and he proved his case. This was the first time that this revolution round the sun was proved for any comet.

He found that just about seventy-five years before 1607 a comet had been seen, and seventy-five years before that—in 1456—a comet had been seen which had terrified the world—terrified it so much that the pope ordered prayers to be offered for protection against it. This same comet returned in 1910, but was a great disappointment, for it was so small and so insignificant that even the most ignorant and superstitious were not frightened by it.

Halley predicted that the comet would return again about 1758. Later it was calculated that Jupiter and Saturn, by their gravitation, would slightly delay the comet, so that it was expected in 1759, and it came in that year. So it did in 1835. Now, seventy-five years from 1835 brings us to 1910.

Great interest was manifested on its approach. Astronomers everywhere had their telescopes ready to photograph the rare visitor. All were anxious to be the first to discover its coming, and astronomers hoped to be able to discover more of its composition than could be found out by the crude instruments of seventy-five years ago. As has been explained to you elsewhere we can tell by a ray of light what elements are present.

THE COMET SEEN AT THE NORMAN CONQUEST WHICH WAS SEEN AGAIN

We need not be told that, since the year 1835, the science of astronomy has advanced enormously. We were able to learn things about Halley's comet, when it returned, which Kepler or Halley or the astronomers in 1835 would never have thought possible. We were able, for instance, to learn a great deal about the very chemical elements of which the comet is made.

We have already learned that a comet may lose part of itself, and, indeed, it is probable that the life of comets, so to speak, is not nearly so long as the life of a star or even a planet. They are apt to break up. When Halley's comet was last seen, it was very much smaller than it had been before, and it was smaller still this time. There is a famous tapestry, called the Bayeux tapestry, which shows the comet as it

appeared in the year 1066, the year of the Norman Conquest. I think we may be sure from that tapestry that the comet was then even larger than it was when it frightened the world nearly 400 years later.

THE STORY OF MANKIND IS NOT YET AS LONG AS A COMET'S YEAR

To judge by the length of our little lives, seventy-five years is a very long time, but there can be no doubt that there are many comets which have a far longer period, as it is called, than this. There are comets which only return to the neighbourhood of the sun in thousands or even hundreds of thousands of years—that is to say, their year is as long as hundreds of thousands of our years.

Now, recorded human history only goes back for about 10,000 years, and the real length of the life of mankind upon the earth cannot yet be as much as 500,000 years. So the path of these comets gives us a new kind of scale to measure time by, and makes our little "history periods" seem very short. We might think at first that, surely if a comet travels out so far from the sun as these tremendous periods of time suggest, it must encounter another star, and come under the influence of its gravitation. But the sun and the solar system are very much alone in space. The nearest fixed star is 20 millions of millions of miles away, and so there is plenty of room, so to speak, for a comet to travel out tremendous distances without getting within reach of any power that can draw it away from the sun for ever.

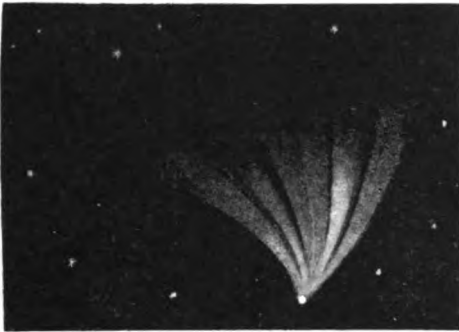
IF A COMET'S TAIL SHOULD STRIKE AGAINST THE EARTH

We may also ask whether the life of a comet can last long enough for these periods, as we know that comets are apt to break up. But it is probable that their breaking up largely depends upon light-pressure and upon the sun's heat, which only act when they are comparatively near to the sun, and therefore, of course, when comparatively near to us. When the comet is pursuing its path far away in space, there is probably no reason at all why it should break up.

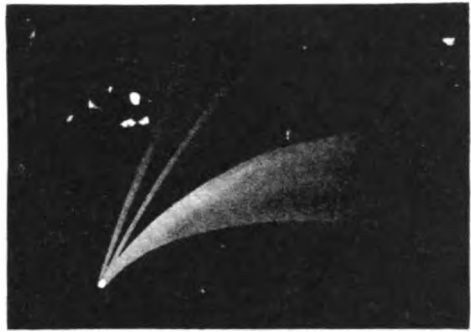
It has been supposed that a comet, or the tail of a comet, might strike the earth, and that if this happened the earth might be destroyed. But there is reason to believe that the tail of a comet has touched the earth without anything terrible happening. The truth is that the tail of a comet is made of such very fine and rare stuff that it can do no harm. One proof of the rareness of a comet's tail is that the stars can quite

are due to the comet being heated by the sun, and gases being thus made to come out of the nucleus; then the pressure of light acts on them and produces the comet's tail.

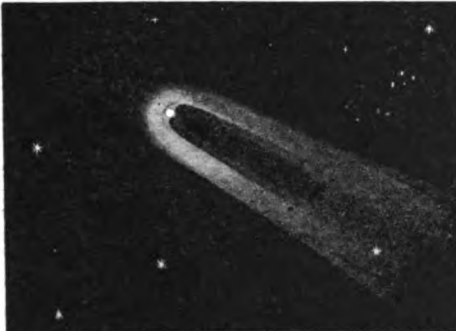
Now we must go on to the study of meteors, but we shall find that we have not really left the subject of comets after all. The ordinary name for meteors or meteorites is shooting stars. Of course, we must get out of our heads



THE COMET OF 1744



THE COMET OF 1858



THE COMET OF 1861



THE GREAT COMET OF 1892

The brightest and biggest comets can be seen plainly without the aid of a telescope. Here are pictures of four important ones, from which we see that comets vary greatly in shape. Their tails and streamers change from time to time, getting bigger as they approach the sun, and smaller as they travel from it. The tails of some comets are a hundred million miles long, greater than the distance from the earth to the sun,

plainly be seen through it. But it may be that the stuff in a comet's tail may condense, when it has broken off from the comet and is becoming cold. At any rate, we are not to think of a comet as a solid thing, but as made up of tiny parts, and largely consisting of gases. Up to the present the study of the light coming from comets shows us that they contain carbon and hydrogen, probably in the form of compounds belonging to the class of hydro-carbons, which we have already studied, and of which marsh-gas is an instance. It is probable that the things we see going on in the head of a comet when it is near the sun

once and for all anything that the word "star" suggests to us in this phrase. I have known a young child to be terribly frightened by supposing that a meteor was a falling star which had suddenly shot out of its place in the sky and was going to strike and destroy the earth. A so-called falling star or shooting star is no more a star than a bit of coal is. But the name tells us that long ago meteors were thought to be stars; but that was when no one guessed that the stars are suns, nor was it known then that the little lumps of iron sometimes found in the ground are all that is left of meteors.

Meteors fall in greater numbers at special times of the year, and also in special years. On some nights in November in certain years we may see hundreds falling. We must remember also that they are falling all the time, more or less, only, of course, we do not notice them in the daytime any more than we notice the stars themselves.

It is only about a hundred years since we have known what meteors are. The space between the planets and the solar system is largely filled with large and small portions of matter. The earth with its atmosphere as it travels acts like a sort of tremendous attractive filter, pulling many of these things towards itself and catching them. Until they meet the earth's air they are cold and invisible, but when they rush through the air—perhaps at the rate of thirty or forty miles a second—they are made intensely hot and brilliant, especially as the oxygen of the air begins to burn them.

In this way, by far the greater number of meteors are turned into gas; and so, though the matter in them remains as part of our atmosphere, they never strike the solid or

liquid surface of the earth at all. What we usually see is the streak of light produced for a moment as the little speck of stuff plunges into the upper regions of the air and is burnt away. Sometimes the track remains bright for a little while, and we suppose that the meteor sheds part of itself as it flies, and that the stuff which was shed glows for a second after the meteor itself has passed.

But not a few times every year the earth catches a meteor so big that it is not all burnt away before it reaches the ground. It is recorded that once a man was killed by the fall of such a meteor. These things are to be seen in museums, and, if we consider where they have come from, they are surely very interesting. They are not made of anything new and different from what we find on

the earth, but of elements which we know well. Of these the commonest is iron. Probably before they fell they had a good deal of carbon in them, but that has been burnt away as they rushed through the air. The surface of a meteor usually shows signs of having been melted. That, of course, we should expect.

Now let us consider the showers of meteors that we see at regular times. The November shower, for instance, is specially brilliant, and the numbers are specially large, not only in November as distinguished from the rest of the year, but also in certain Novembers, just about thirty-three years apart. We have records of these great showers occurring about three times in a century for a long time back. The earliest record dates

from just the end of the sixth century A.D.

We have now learnt that these meteors are travelling in a path round the sun, just as the earth is, but that is not all. There is a comet which travels in the same path. Other shoals of meteors travel round the sun, and comets also in the same paths. We have even some evidence that in the path where a comet once travelled there is now no comet

left at all, but only a shoal of meteors. What we now believe is "that the countless thousands of comets which in time past have coursed around the sun have left behind minute fragments of their mass, which follow in their orbits like stragglers from an army, and that, when the earth encounters a swarm of these fragments, a meteoric shower is produced." These words are quoted from one of the greatest authorities on the subject. Since they were written, five years ago, our proofs are increasing, and if you remember what was said about the principal comet of 1908, you will see how interested astronomers must be to learn that the tail of a comet may be broken off. We know now what is going to happen to that tail. Almost certainly it is going to condense into a shoal of

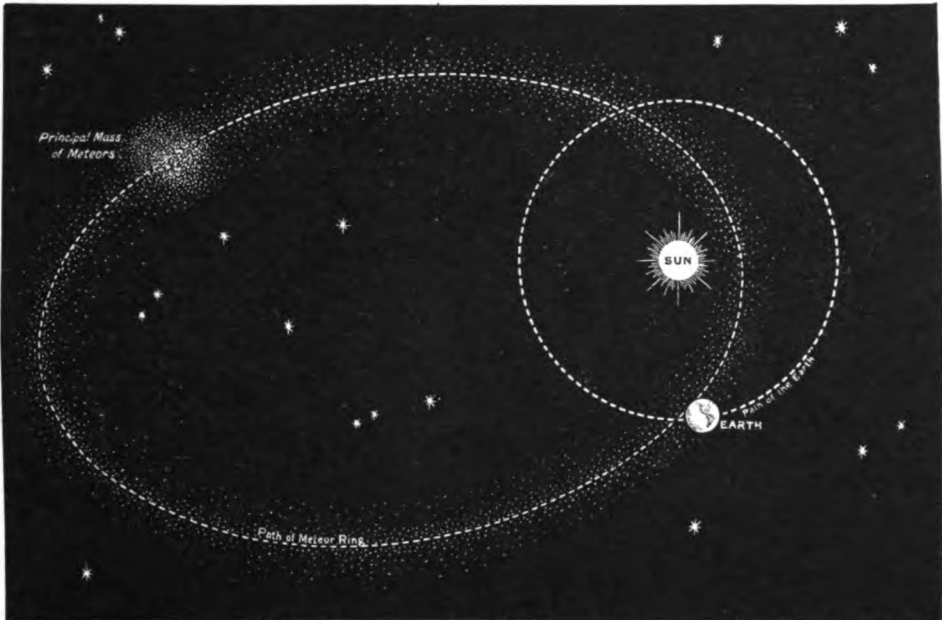


This great meteorite, weighing nearly 1,400 pounds, fell from the sky upon the Alps, and after being used for some time as a seat in a church porch was taken to the Paris Museum. It is called the *Caille aerolite*, and is one of the largest of the known meteors.

meteorites, and perhaps some of these may some day be caught by the earth.

We may ask how it is that the November shower, for instance, returns more or less every November, but especially every thirty-third or thirty-fourth November. The diagram on this page helps to explain that. It shows us the path of the meteors, and we see that it is like a comet's path. Once a year, plainly, as, for instance, every November, the earth crosses this path and catches a few meteors. But once in thirty-three years it catches a great many. The reason must be that

a quite large piece of rock. It is probable, however, that space contains a great quantity of stuff made up of much smaller pieces, more like the dust we see in the air when a sunbeam strikes across a room. Cosmos is the Greek word for the universe, and so this stuff is usually called cosmic dust, but if that word is, perhaps, rather difficult, we may just as well call it sky dust. Some sky dust, like meteors, is, perhaps, the remains of comets, but not nearly all of it can have this origin—there is far too much of it. The earth catches certain quantities of it always as it



Those bright flashes across the sky that we call shooting stars are not stars. They are believed to be pieces of a broken-up comet, and they travel round the sun in a regular path. This diagram shows how the earth every year crosses the path of the meteors, and as the meteors rush through our atmosphere they become white hot, and appear like shooting stars. Where the head of the comet used to be, there are more meteors than elsewhere, and when the earth crosses this part of the meteors' path we see more meteors than usual.

when the comet broke up, or when part of it broke up, and the meteors were formed, most of them stayed together in a sort of group, but some would, perhaps, move a little faster, and others a little slower, moving in the same path, but more sparsely scattered. The great shower is when the earth crosses the meteor's path just at the time when the great body of meteors is passing.

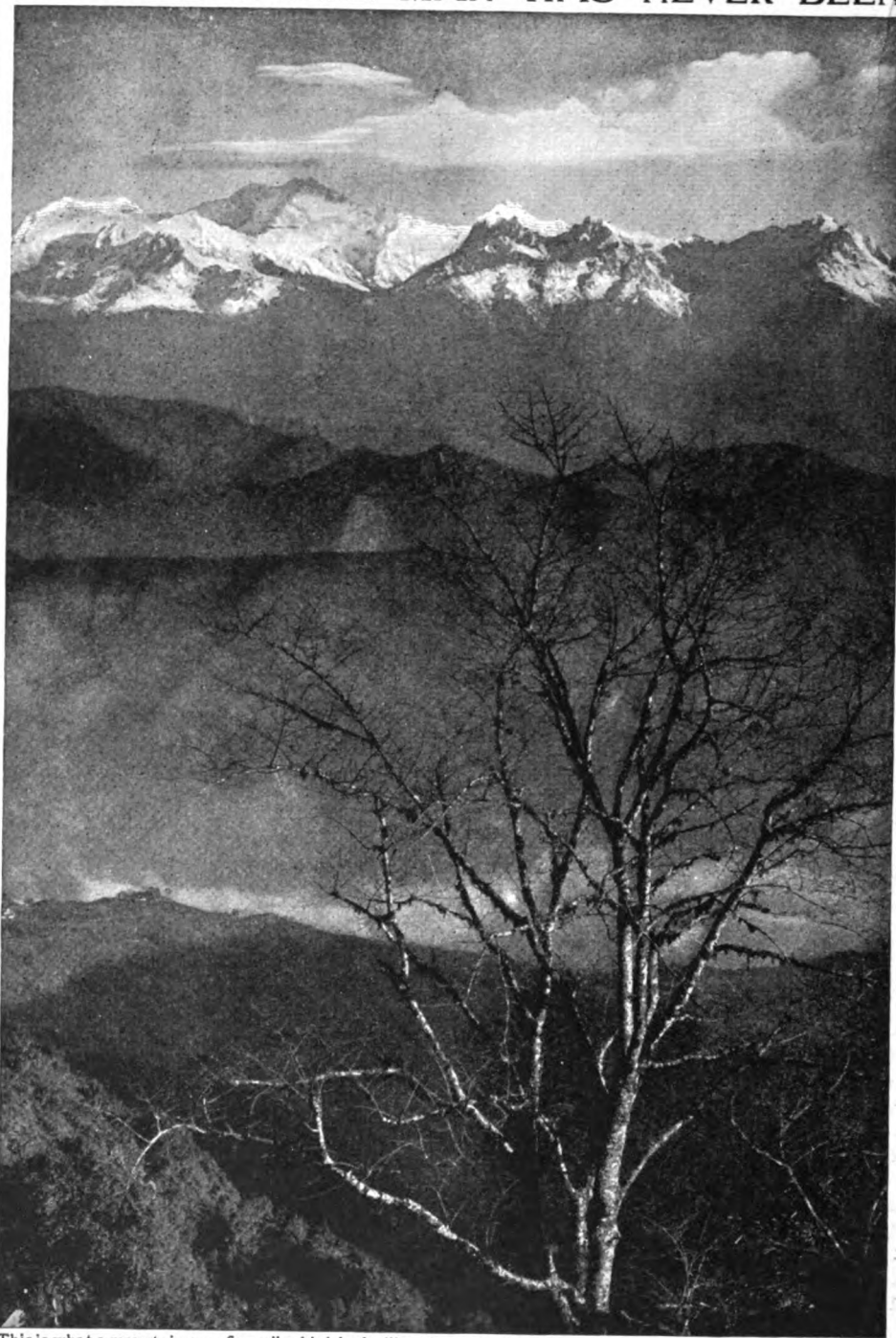
Though falling "stars" are utterly tiny compared with a real star, or even compared with a little body like the moon, yet they may be the size of a big cannon-ball, or even, perhaps,

travels—the earth filters some of the sky dust out of the ether, we may say. We know very little yet about the history of this stuff. We may suppose that it was, so to say, left over when the planets were being made out of our nebula long ago. But we know so little about it yet that we need say no more about it here.

Now we have finished our story of the solar system. We began with the sun, and we have ended with dust. After this we must turn to the real stars, about which we have already learnt the greatest fact, namely, that they are suns.

The next part of this is on page 2609.

A PLACE WHERE MAN HAS NEVER BEEN



This is what a mountain over five miles high looks like when you stand fifty miles away. It is Mount Kinchinjunga, 28,156 feet high, in the Himalayas, photographed from Darjeeling. The highest peak in the world is Mount Everest, close by, which is 29,002 feet, but that does not look so high because great mountains surround it. No one has ever been to the top of either peak, for the thin air is difficult to breathe. In 1900 travellers climbed 21,000 feet up Kinchinjunga, but in South America men have reached the top of Aconcagua, 23,393 feet high.

From a photograph by E. G. Ponting



DOES LIGHT DIE AWAY?

IF it were the case that light were stopped and made into nothing as it travelled through the ether, half of the things we believe about the sky would have to be given up; but ether does not soak up, or absorb, any of the light it conveys. Of course, light may disappear between a star or a planet and our eyes because it is stopped, not by the ether, but by something material, such as sky dust.

The light of a star will disappear if the star grows cold and "goes out." Any star we see to-night may already have gone out—for the light we see it by left it long ago. Though light may be so steady and seem so permanent, yet we must think of it as we do of an electric current. Light really is a sort of electric current. It has to be made and kept up from moment to moment. To make light you must—or a star must—*spend power*; and if the new power is not forthcoming the light will cease, just as an electric current will cease if the battery runs down. So that light dies away if you do not continue to make it.

HOW FAR CAN LIGHTNING BE SEEN?

We can be sure that lightning can be seen for very many miles. We can judge the distance of a lightning flash by counting the number of seconds between the lightning and the thunder. Probably only the roundness of the earth prevents us from seeing lightning still farther than we do, for, of course, the time comes when the light, as it flashes through the air, will be cut off

CONTINUED FROM 2460



from the eyes of people far away, because they are, so to say, "round the corner" of the earth. In questions like this we must remember that light can travel to any distance, and will, indeed, travel to infinite distances so long as nothing stops it.

Thus, if the light remains bright enough for our eyes to be affected by it, we can see, as we say, to the distance of the thing which is giving out the light. Thus, when we see a star, we see to a distance of billions of miles.

DOES LIGHT GET FAINTER AS IT TRAVELS?

We know that the farther off a bright thing is, the less bright it seems. We know that the little moon, or a planet like Venus, is brighter than the stars to our eyes, though not a ten thousandth part so bright in reality, because it is near. Yet we said in the answer to the last question that light will travel on for ever unless it is stopped. So far as we can judge, light, as it travels through the ether, suffers no loss at all; none if it is absorbed or lost.

Yet we know that, somehow, light gets fainter as it travels. The reason is that the light spreads in all directions as it travels, and so gets less intense at any particular place—as, for instance, where it strikes the curtain, or retina, of our eyes. If you have ever played with a magic lantern, you know what a bright spot of light it throws when it is placed near the screen, but when it is moved farther away the light gets fainter as it gets wider. The law

governing this is known precisely. If the distance is doubled, the light is one-fourth as bright; if trebled, one-ninth as bright; if quadrupled, one-sixteenth as bright. To get the intensity, you must take the square of the distance—i.e., multiply it by itself, and then the intensity is so much less. We say that it varies *inversely* as the square of the distance. If it varied *directly*, then the light would be sixteen times as bright, when the distance was four times as great, instead of being one-sixteenth as bright. This "law of inverse squares" is true for the intensity of light, sound, magnetism, heat, and gravitation.

WHY DO WE HEAR THINGS MORE PLAINLY BY NIGHT THAN BY DAY?

There are more reasons than one for this. The first is that there are fewer noises at night, and so those we do hear are better and more distinctly heard, since they are not confused with others in the air, and also since they are not confused with others in our ears. A second reason is, I think, that our ears are usually much more sensitive at night, so that we hear things much better. I don't mean, of course, that our ears are more sensitive when we are asleep, but that when we are just awakened, or when we are just going off to sleep, our ears are specially acute.

The same thing is true of the ears of anyone who is taking chloroform or ether for a surgical operation. Thus, two sounds which, measured by some lifeless machine, are of exactly the same loudness, will sound very different to our ears according to whether we hear them in our ordinary wide-awake state, or at night when we are half asleep, or when we have been suddenly awakened and are straining our ears to hear. This straining is a real thing. We tighten the drums of our ears, so that they vibrate better to sound, and so we actually hear more loudly.

It may also be that in some states the night air may conduct sound-waves better than in the daytime.

HOW CAN PEOPLE FORETELL THE WEATHER?

Though people who foretell the weather are sometimes wrong, and though we usually remember when they are wrong and forget when they are right, yet it is true that people *can* foretell the weather, and that those who do it best are much oftener

right than wrong. One way of foretelling the weather is simply by noticing what has happened before, without any attempt to explain why. We all know the lines which say that A red sky at night is the shepherd's delight, A red sky in the morning is the shepherd's warning.

These lines express what most of us know by experience. Many people who notice this kind of thing may be more or less weather-wise, though they know nothing at all about what makes the weather; but they will be very often wrong.

The scientific way of foretelling the weather depends on our understanding the causes of it. We know, for instance, that when the air in a place is less dense than usual, which we mean when we say that the atmospheric pressure is low, there is likely to be wind coming in from parts round about to fill the space which is comparatively empty of air; and this wind, if it comes from the direction of the sea—as it always must in this island of ours—will probably bring rain with it. So the barometer, which tells us the pressure of the atmosphere, helps us, at the same time, to foretell the weather.

IS THERE A NAME FOR THE SCIENCE OF THE WEATHER?

We know that the names of sciences often end in -logy, since *logos* is the Greek word for a discourse about anything. Thus, we have such words as *geology*, the study or discourse of the earth; *biology*, the study of life, and so on. We also have the word *meteorology*, for the science of the weather, and there is in the United States a Weather Bureau, where people study the weather, and from which come the forecasts we see every day in the newspapers.

Of course, the barometer is one of the chief instruments used at this office; but the office is much helped nowadays by the telegraph, and even by ocean cables and wireless telegraphy. By these means we can know in advance what is happening over, say, the Atlantic Ocean, and can foretell the weather because we know that certain changes in the pressure of the air are travelling in our direction. Sometimes we find places in the air where the pressure is high, and lower round them, or places where the pressure is low, and higher round them, and these cyclones and

anticyclones, as they are called, travel over the surface of the earth, and bring changes of weather with them.

WHY DOES A WET PLATE GET DRY IF WE LEAVE IT ALONE?

This is due simply to what we call the *evaporation* of water, and the great fact about this is that it occurs at all temperatures. It is true that on a hot day, or when put before a fire, a plate may get dry much more quickly than otherwise, but water everywhere *evaporates* at all temperatures, though the rate varies according to the amount of water already present in the atmosphere. It is that, and not the temperature, that counts. Sometimes, whatever the temperature, we may find that the wet plate does *not* get dry when we leave it, and even that dry things get damp. Matches will not strike, we find, and writing-paper is quite moist. In such cases the air has been holding more water than it needed, and has deposited it on everything exposed to it. That, of course, is what happens when the dew falls, and if you laid a wet plate on the grass in the evening, you would certainly not find that it became dry, but wetter.

WHY DO ROUGH WAVES BECOME CALM WHEN OIL IS THROWN ON THEM?

We must not think that we can abolish waves altogether by throwing oil upon them. The waves, driven by the wind, will go on as they did before, but it is just the surface of the water, including the waves, that is affected by the oil. The oil is lighter than water, and floats on its surface. Though it is lighter, yet it is a very different kind of liquid, and the molecules making it up are much more closely attached to each other than the molecules of water are. We have a special word for this difference in liquids. We say that some are more *mobile* than others, which simply means that they are more movable; and we say that some are more *viscous* than others, which simply means that they are more sticky. Water is very mobile, though not quite so mobile as some liquids, such as "sulphuric ether," which is used for sending people to sleep; and oil, on the other hand, is very viscous. A mobile liquid, when it is shaken, readily breaks into drops, and so forms spray; but you can scarcely make a

spray of oil, whatever you do to it. So, by pouring a layer of the very viscous liquid oil on the mobile liquid water, we stop the spray, though we do not stop the waves, and we prevent the waves breaking, as they would otherwise do, against the sides of the ship. This may be well worth while, as it may mean that only a very little water, or none at all, is brought aboard, where, before, every wave was breaking and threatening to waterlog the ship.

WHEN WATER IS PUT ON AN OILY PLATE, WHAT CAUSES IT TO GO INTO BEADS?

We all know that water and oil will not mix together. The reason for this is that the molecules of the water, and the molecules of the oil, hold very much more firmly to each other than they do to molecules of the other kind. This holding together is very weak, comparatively, in the case of a mobile fluid like water, and so, when it has a chance, it flows very easily and widely over any surface that it may be upon. But if the surface happens to be covered with oil, the water cannot do this. Perhaps it might if water were lighter than oil, but it is heavier, and so everywhere the oil tends to rise above the water, and breaks it up into a number of little drops or beads, which cannot spread themselves out, because they cannot break through the ring of oil molecules which surrounds them, holding each other's hands very tightly, as it were.

WHY DO OUR FACES KEEP WARM WITHOUT CLOTHES?

The answer to this very interesting question is that it is all a matter of custom. Our faces, exposed to cold, *do* get cold, as we could show at once by placing what is called a "surface thermometer" on them; but they do not *feel* cold, because the nerves by which we feel cold are accustomed to this state of things, and take no notice of it. It is true of all nerves that they only notice differences from what they are accustomed to. We tolerate, without noticing them, degrees of cold to which we are accustomed in our face and hands; but we feel our feet cold, and may even "catch cold," if we expose them. But people who are accustomed to bare feet feel no more, and suffer no more, from them than we do from bare hands. On a winter day we may

not notice that our noses and ear-tips are cold, but they *are* cold, though we feel nothing. You soon find that, if you put a warm hand against them; and the other proof is that they are very apt to get frost-bitten in cold climates. There is all the difference between *being* cold and *feeling* cold.

This law about custom, and the way in which nerves are affected by it, is one of the most important in the world, for it explains the way in which we learn to get accustomed to all manner of things, and it tells us why the countryman cannot at first sleep in the city on account of the noise, while the townsman often cannot sleep in the country on account of the silence. At last, however, the countryman gets used to the noise, and the townsman gets used to the silence, and both sleep sound and well. All we really feel is *difference*.

HOW DID THE GAS GET INTO THE COAL?

When we look at a dry, firm lump of coal, it does not look as if it contained any gas, for there are no visible spaces for the gas to be in; nor does it look at all oily. These things do not exist in the coal before something is done to it. We say that coal is mainly made of carbon, but a great deal of this carbon is combined in it with other elements, such as hydrogen. Coke is much more nearly pure carbon than coal is. When coal is heated it is largely changed, partly by the heat and partly by its being burnt, and then the gases are *made* which we can get separately and burn, and which give its cheerful flames to an ordinary coal fire.

WHAT IS IT THAT MAKES COAL BURN?

Coal burns, as other things do, by combining with oxygen. In order to do this, it must be hot; and so we have to make it hot before it will burn. But when once it has started burning, it produces so much heat and makes itself so hot that it will go on burning. A single piece of coal that has fallen out of the grate will not go on burning. It is exposed to the cool air on all sides, and loses the heat it makes so quickly that it soon falls below the temperature at which the burnable things in coal will combine with oxygen, and so after a time it grows dark and stops burning. Coal will only burn in an ordinary fire,

because the lumps lie close together and keep each other warm enough.

The burnable things in coal are very numerous and we do not know nearly all of them. If we consider that coal is the remains of living creatures, and if we remember how infinitely complicated is the chemistry of living creatures, we shall understand how complicated the chemistry of coal must be. But at any rate we know thoroughly one part of its chemistry, and that is that practically only two elements are responsible for the burning of coal and for the making of the endless compounds which it contains; the elements are carbon and hydrogen.

WHAT ARE ASHES MADE OF?

We know that, however thoroughly we burn a piece of coal, and however good the coal is, there is a certain proportion of it which will not burn, but drops to the bottom of the fire, and has to be raked out afterwards. We throw these ashes away and think of them as useless. But they contain all sorts of very valuable salts. We have heard of potash, a compound of the element which was found a century ago and called *potassium*. Well, potash is really pot-ashes, and this tells us something about the composition of ashes. The plant body from which coal is made contains many salts, just as our own bodies do, and these salts—salts of potassium and other metals, such as *sodium*—are already burned, or oxidised. That is why they cannot be burnt any more in the fire, and fall to the bottom, instead of going up the chimney in the form of gases. These ashes are really very valuable as food for plants, or manure, for they contain the very salts that present-day plants need for their lives, and must get from the ground if they are to live.

If our own bodies were burnt we should find ashes left, just as when coal is burnt, and these ashes would be very similar in most ways to the coal-ashes.

WHAT IS THE USE OF COAL-TAR?

Besides gas and ashes, we can get out of coal the stuff we call tar or coal-tar, and this has all sorts of remarkable uses. It is one of the most complicated things in the world, outside the realm of living things, and it is so, just because it is really the product of living things of long ago. Nothing could be uglier

or less interesting to look at, yet it is the source of some of the most exquisite colours in the world. All sorts of beautiful dyes, used for clothes and many other things, such as painting, are made from coal-tar. The great discovery of the first of these, called mauve, and of many more, was made by an Englishman named Perkin, who died a short time ago. But science has never been properly studied or appreciated in England, and so now we get nearly all our coal-tar dyes from Germany, where Perkin's work has been carried much further.

But we get still more useful things from coal-tar, for it contains substances which can be made into all sorts of medicines, and especially such things as carbolic acid, which kills microbes, and has already saved millions of human lives since its use was discovered by Lord Lister just forty years ago. Indeed, it would be quite easy to write a book about coal-tar, which is now known as one of the most valuable things in the world, though only half a century ago it was looked upon as little more than mere worthless waste.

WHAT IS A CONSTELLATION?

Stella is Latin for a star—as every little girl named Stella knows very well, of course—and *con* simply means with or together. So the constellations are the groups or families of stars that we seem to see in various parts of the sky. I say “seem to see,” for as a rule there is no reason to think that the stars which seem so near together are really near at all. Of two stars seen side by side, one may be a hundred times as far away as the other. But these groups of stars or constellations, like what we now call the Plough, are even more impressive and noteworthy than any single star; and so, in many cases, the names of the constellations may be older even than the names of the stars which go to make them up.

But there is one very special reason why the constellations have been studied and watched by men for countless ages. It is because they thought that the constellations all had special meanings for the lives and happiness of men. The same was thought of the planets. So when a certain planet seemed to be passing or wandering—

you remember that planet means wanderer—through a certain constellation at the exact time when a child was born, it was thought that, all its life, the child would be affected by the planet. One thing—perhaps something nice—would happen when this particular planet was passing through one constellation, and another thing—perhaps even a great risk of death or injury—would happen when the planet was in another constellation. We now know that all this is false, and the very worst kind of lies; for it led people to trust and believe in things that had nothing to do with them, instead of remembering that God rules all, and that the way to be happy is to do the right and leave the rest to Him.

HOW DO WE KNOW THAT THE EARTH IS IN MOTION?

We have lately found a rather new way of showing that the earth is in motion—by setting something spinning, rather like a top, and showing that it seems to change the direction of its spin in a way which can only mean that the earth on which it spins is itself spinning. But it was known that the earth is in motion long before this way of showing it was found. Really we know that the earth is moving just as we know that even the smoothest train is moving—by the fact that other things seem to move beside it. In the case of the train these other things are the telegraph-posts and fields and hedges; in the case of the earth the other things are the sun and moon and stars, and even comets, when there are comets to be seen. All the heavenly bodies, without exception, seem to rise in the east, move over the face of the sky, as we say, and set in the west. It is quite impossible that this can mean anything else but that the earth is spinning towards the sun, moon, and stars as they seem to rise, and spinning round away from them as they seem to set.

DO ALL THINGS MOVE IN SPACE?

Of course, the sun and the moon, and even, as we now know, what used to be called the “fixed stars,” have motions of their own—their *proper* motions, as they are called, proper really meaning “belonging to”; but the motion which proves that the earth is moving is called their *apparent* motion, for it only seems or appears. The earth is

moving, and not they. The marks of this motion are that it is *common* to all the heavenly bodies, though their own or proper motions may all be quite different from each other; and that it is daily, or *diurnal*, which is Latin for daily. The best proof of the earth's motion, then, is the *common, apparent, diurnal* motion of the heavenly bodies, which can only mean that the earth spins right round on itself once a day; just as the best proof of a train's motion is the *common, apparent* motion of everything on both sides of it—common, or shared in by all objects, even though these may include cows or horses running in opposite directions to each other. That, of course, is their own or *proper* motion. Everything moves.

WHAT MAKES BRASS WARM WHEN WE RUB IT AGAINST WOOD?

The Latin name for rubbing is friction, and by that word we now mean everything that happens when one thing is rubbed against another. There may be friction between the outside of one thing and the inside of another; or inside something, as when water is shaken and the molecules rub against one another. If we prevent the heat of the water leaking away, we can actually make cold water boil simply by stirring it.

Now, heat is really a special kind of motion—a special motion of the atoms or molecules of any kind of matter. If we remember this, the rest is easy to understand. For nothing is commoner or simpler than the change of one kind of motion into another. Whenever you throw a ball, the motion of the fibres of your muscles, as they shorten, is changed into the motion of the ball. When steam drives an engine, the motion of the molecules of the hot steam is converted into the motion of the wheels—while the steam loses its heat.

And just as heat can be converted into the visible motion of an engine, so visible motion of any kind can be converted into the special kind of motion called heat, which is exactly what happens when we rub brass against wood. The point is that nothing comes from nothing; if the motion we call heat appears, then the visible motion of the rubbing must disappear. And the harder you rub, the greater the heat. If there is no friction, or very little, as when something slides very smoothly on glass or ice, you will

get no heat, or very little, *just because* you lose no visible motion, or very little. That is to say, the whole of your energy, or nearly the whole of it, is changed into visible motion, so that none is left to make heat. Exactly in so far as the wood stops the motion of the brass, so far do the brass, and the wood, get hot.

WHERE DOES A COLD COME FROM, AND WHERE DOES IT GO TO?

A cold is due to microbes that attack our nose and throat, and in bad colds even our upper air-passages. The microbes probably come from someone else who has a cold almost in every case. We do not know whether the cold-microbe lives anywhere except in the throats and noses of human beings. If it does, perhaps a cold may come from the soil, or wherever it is that the microbe lives; but usually the answer to the first half of the question is that the cold comes from someone else. Unfortunately, he is none the better for having given it to you. The answer to the second half of the question is that, so far as we are concerned, the cold ends because, after a few days, our bodies learn how to deal with the microbes, so that they are either killed, or else can do us no farther harm, and so we recover. But the cold may often go to other people, just as it came to us.

HOW DO WE GIVE ONE ANOTHER COLD?

We give one another colds in many ways, the result of all of them being that we pass our cold-microbes on to others. I do not think, added the Wise Man, that people are nearly careful enough about safeguarding other people when they have colds. Doubtless the other people are just as careless as the person who has the cold; but, at least, if we do not keep ourselves away from company, we should be careful about not coughing or sneezing or even speaking opposite the faces of other people in case they catch our cold.

Also, the time will probably come when people who have colds, and diseases a thousand times more serious than any cold, will not be allowed to send handkerchiefs to the laundry, where now women daily catch all sorts of diseases from the clothes they wash, which have come from many different homes where there are sickness and disease.

The next Questions begin on page 2619.



WINTER'S WHITE DIAMONDS

UNCLE PETER was coming to spend Christmas with his nieces, and Christmas that year brought Uncle Peter and the snow together. On the night before his arrival, while everybody was asleep in the village, down through the cold air to the hard and frost-bound earth fell the white feathers of the sky. In the morning the children woke to find their world completely buried under a mantle of shimmering white.

Uncle Peter changed his clothes, put on a pair of monstrous, thick boots, and led the way into the garden. "Get two or three spades," he ordered, and when these were brought he began to pile up the snow in a heap. Very soon he had a tower seven or eight feet high, solid and hard. Then he carved and shaped it, and made it a handsome youth with his arm raised to throw a dagger.

In the afternoon the snow began to fall afresh.

"Ah!" said Uncle Peter, "I've been waiting for this. Now come here and listen to me. Can you see through snow? No? Very good. So snow is a solid something which the eye cannot see through. And what is the shape of it? What is the shape of the flakes as they fall through the air? You don't know! Well, I'll tell you something. There are two things—coal and snow—which are the very opposites of each other in colour. 'Black as coal,' we say, and 'white as snow.' Miners

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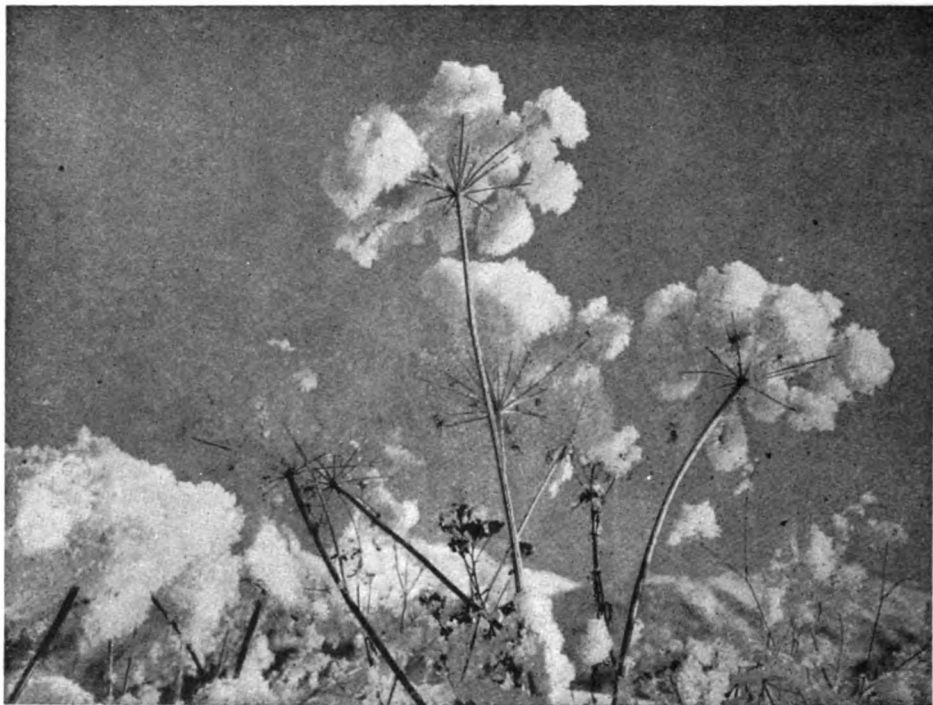
speak of coal as 'black diamonds.' Curiously enough, snow is composed of 'white diamonds.' Yes, the most beautiful and delicate white diamonds. And, more curious still, it isn't white at all! Now look at this." He held out his arm, and as soon as a flake had fallen upon the black cloth of his sleeve, shielded it with his hand. "Quick!" he said, showing it to the children. "It sparkles like a diamond, and is like a star with six rays, and it isn't white and it isn't solid."

They were very much surprised.

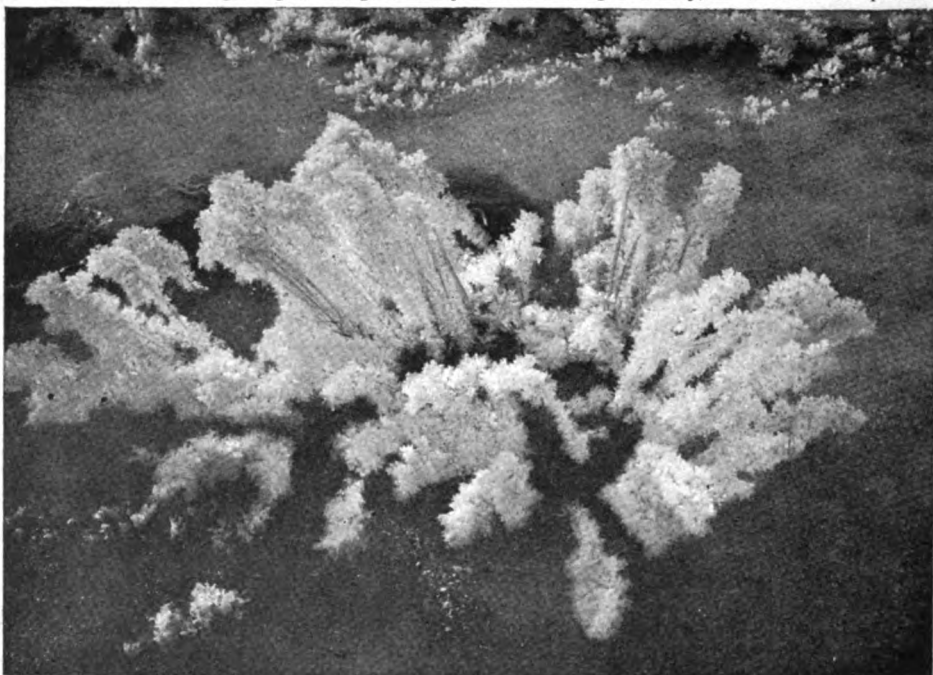
"Snow looks white," said Uncle Peter, "but it is really the colour of ice, and it really is ice. It looks white because it lies in a dense mass, and, with all its needle-point rays, breaks up and scatters the light in every direction. When you crunch up a snowball you damage these delicate needle rays, but you could not altogether destroy the fine particles of the little diamonds. They scatter light and make themselves look whiter than paper. Snow, which makes the earth look so beautiful, is neither more nor less than frozen water. It only shows us what extraordinary changes can take place in the same thing—hail, sleet, mist, fog, ice, rain, snow! You yourselves, if you try very hard, may change from thoroughly naughty, stupid, cruel, and wicked young savages into cherubims and seraphims as white as snow."

Then he had to run away quickly under a perfect hail of snowballs.

THE BEAUTIFUL WORK OF THE HOAR-FROST



Jack Frost is a wonderful artist, and when the flowers and leaves have fallen, and nothing but the bare stalks remain, he can, in a single night, change a bare plant into a thing of beauty, as we see in this picture.

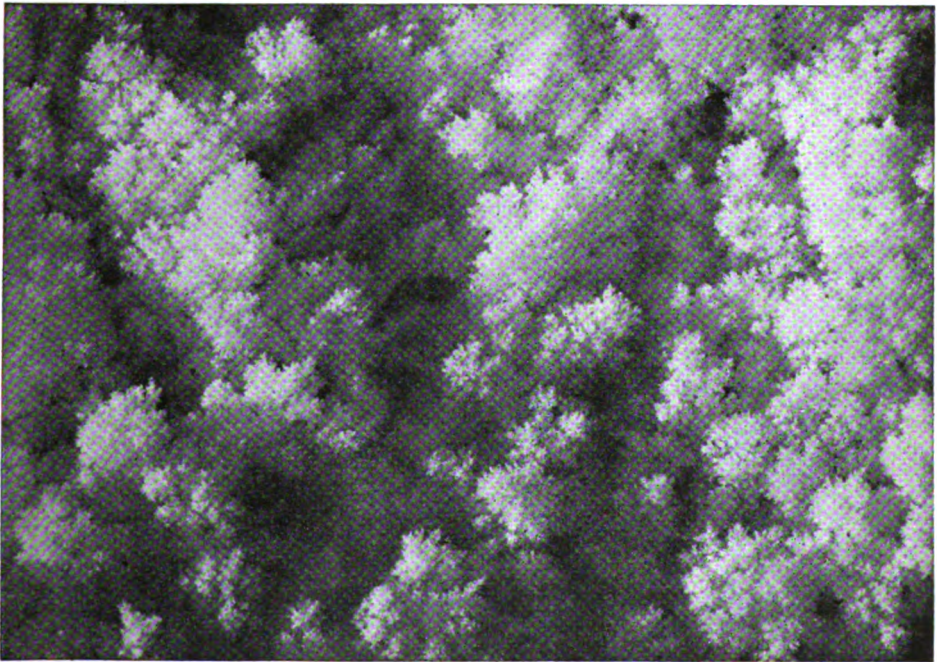


Even the tall, straight reeds that grow by the river are made to blossom with glistening white flowers, equal in their delicate beauty to the flowers of summer. The ice flowers in this picture were formed on rushes growing in a frozen river, and everywhere the hoar-frost—which means simply white frost—had decorated the landscape.

THE FLOWERS IN JACK FROST'S GARDEN



Sometimes whole fields and stretches of country may suddenly become huge beds of white glassy flowers. Here we see a bed of frost flowers on the bank of a frozen river. The crystals of hoar-frost that make up these flowers, if seen through a magnifying glass, look very much like the beautiful and varied snow crystals on page 2519.



It is not only upon trees and grass that the hoar-frost takes such pretty forms. This picture looks very much like a mass of delicate white coral, but it is really a picture of piled-up crystals of hoar-frost, as they were deposited, many inches deep, upon a stone. Any stone lying in the road will look like this after a heavy night frost.

The photographs on these pages are by Prof. R. B. Young, G. R. Ballance, Percy Barron, and G. P. Abraham

HOW WINTER PAINTS THE WORLD WHITE



A very beautiful effect is produced by the deposit of hoar-frost upon bare trees, like the birch shown in this picture. Every branch and twig shines as with gleaming silver.



When the deposit of hoar-frost is very heavy, the effect is remarkable, as we see here, though much of the delicate beauty is lost by the massing together of the crystals.



Travellers go to Switzerland in the summer and are delighted with the beauties of that wonderful country. But its glories in winter, though different, are not less delightful than in summer. We can see from this picture, showing a home among the Swiss mountains, how beautiful the scenery may be made, even in the colder weather, by the touch of the snow. The houses, the trees, and the ground all wear their white and glistening mantle.

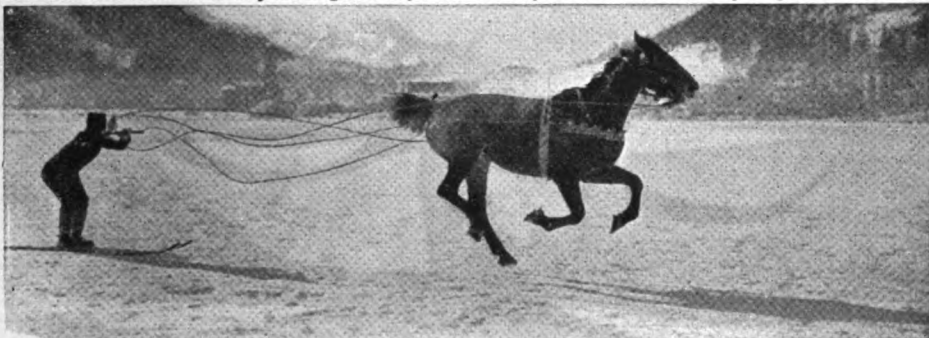
WHITE PLAYGROUNDS IN THE MOUNTAINS



There is no more exciting sport in countries where the snow lies for months at a time than tobogganing. We read about tobogganing on page 2349, and here we see a team of five men winning a toboggan race in Switzerland.



When only one man rides on a toboggan, he lies down full length, like this. The position is not so comfortable as sitting up, but the rider can travel at a very much greater speed in this way. A delightful sport in the lands of the snow is ski-running. Skis, pronounced "shees," are like skates with very long wooden runners.



Very exciting, though rather dangerous, is ski-racing with horses. The runner holds a rope attached to a horse, and lets the animal pull him along at full gallop. It is difficult to keep one's balance, and a fall might be serious.

THE CRASHING OF AN AVALANCHE



Avalanches are a serious danger in the beautiful mountains and valleys of Switzerland. These "thunderbolts of snow," as the poet Byron called them, crash down from the mountains, destroying everything in their way, and the fierce wind that they make, by driving the air in front of them, roots up trees and carries away houses. Forests are specially planted on the slopes of the Alps to break the force of avalanches and save the villages, and in this picture we see the end of an avalanche that has broken through a forest, destroying hundreds of trees.



The word avalanche means "to the valley," and in some of the valleys no houses or villages can be built, because these mighty snowballs, many of them weighing more than a ton, are constantly crashing down, filling up the valleys. Sometimes, when the snow is squeezed into ice, it slides down like a mighty land-slide. The least thing will set an avalanche travelling, even the shout of a boy. We can see from this picture what an Alpine valley looks like after Nature has been playing at snowballs. A falling avalanche makes a roaring noise, terrible to hear.

A RIVER OF ICE AND WHAT IT CAN DO



A glacier is a river of ice which flows down from the mountains until it gets to a warmer climate, where it melts. But, although it is always moving, it does not run fast like an ordinary river. It travels sometimes only a foot a day. This picture shows the glacier at Chamounix, Switzerland. In Greenland some of the glaciers are half a mile thick and fifty miles wide, and when these flow into the ocean and break up, they discharge fleets of icebergs.



Examples of the great glaciers which once covered much of our country still exist in Alaska. We know this because we can see the scratches and marks made by the travelling ice; and we also find, in different places, great boulders of rock which were carried down by the glaciers and left where the ice melted. In this photograph, taken by Professor Young, we see the track of a glacier that flowed long ago.

THE GREAT WHITE TOPS OF THE WORLD



There is something very wonderful in the sight of the great snow mountains, and hundreds of people go to the Alps every year to climb the snowy heights, as we see them doing here. Very often it is necessary to wear blue or green spectacles, because the glare of the white snow, when the sun shines upon it, injures the eyes.



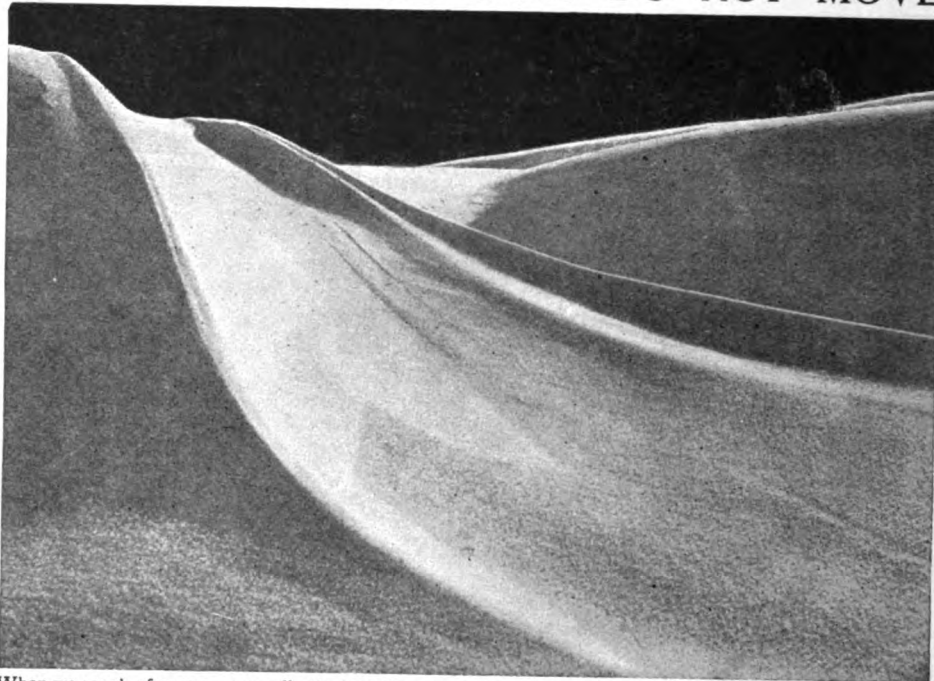
We do not often think of mountains or snow in connection with Australia, the great flat continent in the sunny south. But there are mountains in Australia the tops of which are always covered with a mantle of snow, and here we see some travellers struggling up one of the steep white slopes of Western Australia.

THE COLD OLD MAN OF THE SNOW

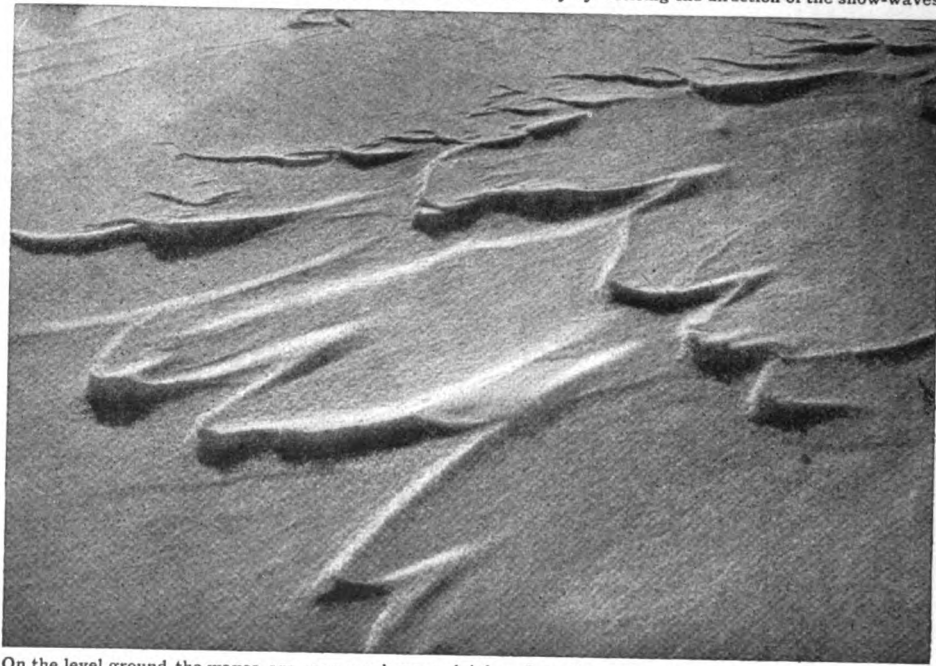


This is the first Snow Man built by the little reader of the Children's Encyclopædia who stands beside it. For days he stood in the centre of a lawn, looking very terrifying in the moonlight nights. Then the little girl would look at it from her bedroom window and almost be afraid of the man she had made. At last the Snow Man melted, disappearing slowly until he was but a speck; and then, as the sun shone upon it, the tiny speck of snow changed into a tear, which sank into the earth as if in mourning for the Snow Man who had passed away.

THE WHITE WAVES THAT DO NOT MOVE

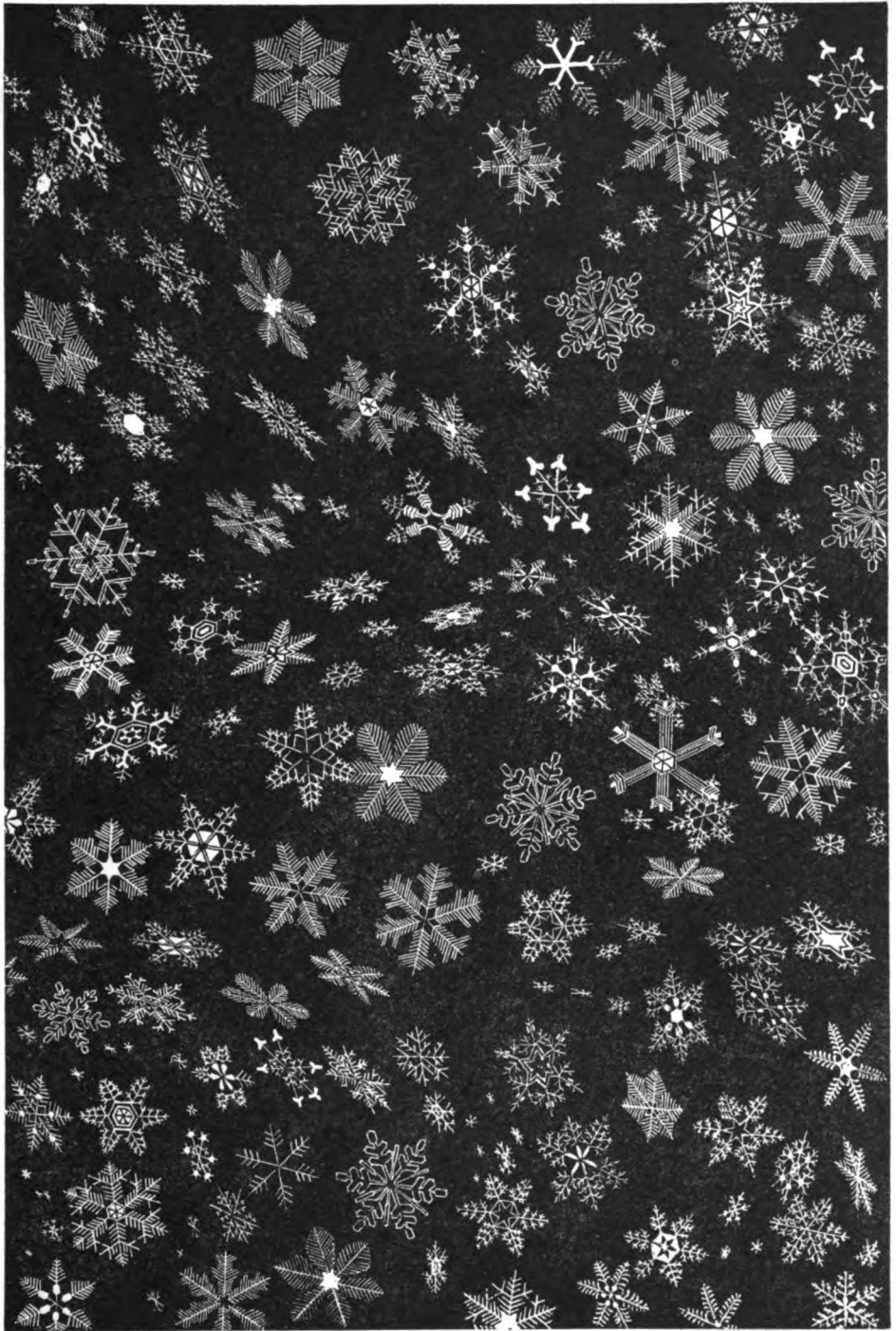


When we speak of waves we usually think of the sea, but there are waves of snow as well as waves of water, and here we see how the wind blows the snow into long ridges, or waves, across hilly ground. Travellers lost in the trackless wastes of Siberia have been able to find their way by noticing the direction of the snow-waves.



On the level ground the waves are seen much more plainly. Sometimes the snow presents the appearance of a choppy sea; at other times there are gentle ripples all over the surface. It is the newly-fallen snow that is blown into waves, and a very curious sight can be seen after a cold night, when the waves formed during the day are frozen hard, and we have the almost unnatural sight of waves that are absolutely motionless and firm.

WHITE JEWELS THAT FALL FROM THE SKY



The most dreary scene looks beautiful when covered with a mantle of snow, but it is not only thus that the snow is beautiful. If the newly-fallen flakes are examined through a magnifying glass, they are seen to be made of delicate crystals arranged in star-like forms as here. It is rarely, however, that more than one or two of these forms fall at one time. When the flakes get pressed together, they lose these dainty shapes.

THE NEXT FAMILIAR THINGS BEGIN ON PAGE 2557

GERMAN HOMES OF LONG AGO



This picture shows what a German village was like about two thousand years ago. The people of those times often built their homes upon wooden platforms in the middle of lakes, so that enemies could not reach them easily.



The Germans first appeared in history as great warriors and hunters, and to make themselves look fierce they used to decorate their heads with the heads and horns of wild animals. Here we are looking inside a German home of long ago, and we see the men of the family arriving home with a bear. The boy standing up is dressed in an animal's skin. Rough as they were, the German tribes always treated their women with great honour.



THE BEGINNINGS OF GERMANY

It was the salt sea breeze and spray that the Britons felt in their faces as they watched from the coast of Kent, beside the terrified old "Guardian of the Shore," the arrival of the first Englishmen in the land that is now England.

No one can say for how long before this these people had lived scattered over the wide and dark continent, but to have watched the entry of their forefathers into the times of which European history tells, we should have had to stand beside the startled dwellers in the great northern plain of Italy, nearly two thousand years ago, and look up from the soft green fields to the high, frozen Alps standing out white against the blue sky.

A truly astonishing sight would have met our eyes. Let us imagine the scene. Multitudes of tall, strong, blue-eyed men are tobogganing down the slopes on their shields. It is powdery snow and sharp little bits of ice that sting our cheeks now.

The long hair streaming behind them is just as fair—though they have some red-haired companions—as that of their descendants who leaped ashore near Sandwich; their shields are just as bright, their war-cry as loud. The appearance, on the whole, that they wear is even more alarming, for their faces peer out of heads of animals, such

CONTINUED FROM 2400



as the wolf, the bear, the ox with his horns. No wonder that at first the newcomers filled Italy with dismay. They had been starved out of their old homes, in the narrow, cold valleys beyond the white mountains, and came eating up all they could

find, burning and destroying towns and villages, sacrificing horses and captives to their fierce God of War.

Such was the entrance into Europe—as far as history tells us—of what we usually call the German tribes. They called themselves *Deutschen*, changed by the Romans into *Teutons*.

Now, the country over which the German families chiefly spread is the very heart of Europe, that great middle part stretching from the Alps to the North and Baltic Seas. A relief map shows us plainly what a sharp contrast exists on the face of this middle part of Europe, not unlike that on the face of France.

Mountains and highlands towards the south gradually slope to the sea on the north, so that a vast plain is formed, well watered by rivers that rise in the heights and flow leisurely seawards. The chief of the rivers is the Rhine, which links the Alps with the North Sea, and has been a disputed boundary through the centuries between France and her neighbour Germany. On the eastern side of the

continent were ever constant changes, as other families of nations pressed on from Asia behind, nations of a different stock from the Teutons or Germans. One branch of these is called "Slaves," or "Slavs." In their own language the word means "glorious," but in other tongues it has come to have a very different meaning, because so many men of the race became bondmen.

It was along the Rhine, that great waterway of Europe, that the Romans chiefly came in touch with the German tribes. Julius Cæsar crossed and re-crossed it many times when governor of the neighbouring country of Gaul. For years the strong nation of Roman soldiers and builders pushed steadily up the long Rhine valley, where the remains of fine cities and forts, splendid roads, and personal belongings exist, as they do in France and England, to this day. They tried to conquer the wild German tribes around, but did not succeed as well as in Gaul and Britain.

HERMANN, WHO TURNED BACK THE ROMAN LEGIONS ON THE BANKS OF THE RHINE

On the top of a hill in the great north plain, about a hundred miles from the Rhine, there stands now a huge statue, over fifty feet high, put up in memory of one of the first German heroes, Hermann, who, in the autumn days of the year 9 A.D., in this neighbourhood successfully resisted the dreaded Roman army. When the news of its destruction in the woods and marshes reached the great Emperor Augustus, he clothed himself in mourning and cried out bitterly again and again: "Give me back my legions."

Englishmen take pride in Hermann's stand for freedom, for they trace his bold spirit in the barons who wrung the great charter from John at Runnymede, and in the leaders who defied the tyranny of the Stuarts. For it was from the very region defended by Hermann—in the lands about the rivers Ems, Weser, and Elbe—that their ancestors came later, to found their new Angle-land across the North Sea.

During those centuries, the various tribes and families surged like the waves of the sea—a very restless, stormy sea, too—over the face of the land, changing their dwelling-places, fighting with each other and their neighbours, and all these years the

great Roman Empire, for a time the ruler of the world, was gradually getting weaker and weaker and less able to hold her own against the on-coming tribes. We remember how the Roman soldiers had to be called home from Britain, then from Gaul. It was a tribe of German stock, the Goths, who appeared at last under the very walls of the great city of the Cæsars, and who finally carried off its treasures, and destroyed many buildings.

ATTILA AND HIS TERRIBLE HOST, WHO SWEEPED ACROSS THE RHINE

The Goths had been pushed on by a terrible host from Asia—the Huns. Yellow of face, with wiry hair, and eyes like slits, they seemed horribly ugly to the German races, who saw them sweep across South Germany into Gaul on their swift horses, devastating the country on their way. They crossed the Rhine, and were then stopped on the plain of Chalons, by the River Marne, where the German tribes of the Franks, West Goths, and Burgundians all joined together with the Romans to resist them in furious battle. The "Scourge of God," as Attila, the fierce leader of the Huns, was called, was defeated and died soon after. His terrible host departed back into the darkness whence they had come.

We have already seen how the Franks pushed into Gaul, and with the Celts, who inhabited the country first, laid the foundations of the kingdom of France. We have seen, too, how other German tribes, the Angles and part of the Saxons, took ship to Britain. The East and West Goths went to Italy and the south of France; and another tribe, the Longobards, or Lombards, settled in the plain of the north of Italy.

THE NEW INFLUENCE THAT CAME INTO THE WORLD FROM ROME

About these times of great changes there came, in the place of the old force of the arms and grandeur of Rome, a new influence from the same city. It was the spread of the Christian Faith. We know how it spread to England and to France. Missionaries also went bravely and devotedly to work in the wilds of Central Europe, men who were not afraid to pitch idols into the nearest lake, or to chop down sacred trees with their own hands, while the wild heathens stood looking on. Many

THE MEN WHO BROKE THE ROMAN POWER



Hermann, who is better known to us by his Latin name of Arminius, is one of the great national heroes of Germany. He defeated the Romans and delivered his country from their rule. Here we see him presenting to the priests of his tribe spoil captured in war. Hermann afterwards was killed in a civil war by his own people.



The Goths, who were a tribe of German stock, swooped down from their forest homes upon Rome, but later they were followed by still more terrible invaders, the Huns. As these cruel warriors rushed across Europe they burnt and destroyed everything in their way. This picture shows us the Huns pillaging a Roman villa. The top picture, which is in Hildesheim Town Hall, is reproduced by permission of the artist, Professor Hermann Prell, and the lower picture, by Georges Rochegrosse, is reproduced by permission of Messrs. Braun, Clement, & Co.

of these missionaries were eloquent Irishmen, but it was Rome, hitherto famed for the power of the Cæsars, that was now gaining a new power and greatness as the seat of the Bishop of Rome, the Father of the whole Church, called the pope. Bishops and clergy passed out of Italy over the Alps and the mountains beyond, over the great north plain, over the Rhine valley, to settle and teach. However far they went, they held fast, as it were, to a cord that bound them closely to Rome.

**THE LITTLE MAN WITH THE GREAT WILL,
AND HIS FAMOUS SON CHARLEMAGNE**

Now, when Pepin, the Frank, the little man with the great will, went to keep the Lombards in order out of gratitude to the pope, who had helped him to become king, he took from them the land they owned about Rome, and presented it to the Head of the Church. This was the beginning of the pope's claim to rule over an earthly kingdom.

Pepin's great son, the hero Charlemagne, also helped on the influence of the Church in his enormous dominions. We have already seen in the story of France how these included, besides what is now France, Holland and Belgium, Switzerland, North Italy, and part of Spain, as well as nearly all that part of Central Europe we now call Germany. Charlemagne gave many estates in all these countries to the bishops and to monasteries, where the clergy lived together, writing books and teaching in schools. More than that, Charlemagne went in person to the rescue of the pope when he was set upon by enemies; so it happened that the great ruler of countries kept Christmas in Rome in the year 800 A.D., and was present at the festival service in St. Peter's.

**HOW THE POPE CROWNED THE GREAT
EMPEROR IN ST. PETER'S**

The pope himself chanted the Mass, and the hearts of the congregation were stirred within them with the grand music and the solemn ceremonial. At the close a great surprise was in store, it is said, even for Charlemagne himself. The pope rose, and taking a splendid crown in his hands, placed it on the king's head, saying: "God grant life and victory to the great Emperor Cæsar Augustus." The soldiers, people, clergy, all burst into loud shouts of delight. Charlemagne was

the strong man of the times, and well fitted to defend a new world-wide Roman Empire of all Christendom—later they called it the Holy Roman Empire—in which the pope's power was ever to become greater over the faith of the nations that composed it.

We shall see what a dark shadow was cast over both Germany and Italy by that union, so loudly applauded in St. Peter's that Christmas Day—a shadow not lifted for a thousand years.

We have seen how soon the great empire of Charlemagne fell to pieces, and how France began to take shape under its own line of kings. In Germany it was very different. For centuries the tribes were gradually settling down into practically independent states, loosely held together under the tie of the empire. The rulers of the states had different titles and powers, and the chief ones elected the emperor, with the help of three powerful archbishops.

Looking at the history of these centuries in Germany is like looking into a kaleidoscope, every turn of which, as the years pass, brings fresh combinations and passing changes, as now one state takes the lead, absorbing others or driving them to another part of the country, now another rises into being as others move about or disappear.

**THE GHOST OF AN EMPIRE THAT DIS-
TURBED A THOUSAND YEARS**

Within 200 years of the death of Charlemagne there were great changes, too, along the eastern borders. The wild Hungarians, of a quite different race from the German families, spread terror over the land. Later they settled down and became part of the empire, though as independent as the rest.

The French writer Voltaire has said that the Holy Roman Empire was neither holy, nor Roman, nor an empire. It has been called a mere spectre or ghost of an empire. But it proved strong enough for a thousand years to hinder German kings giving their best efforts to looking well after their own country, being distracted by the ever-enticing vision of power on the other side of the Alps. Their Italian subjects hated them, and the quarrels that arose between the emperors and the popes were so constant and so fierce and so intricate that a just settlement became more and more impossible as the years dragged on.

TWO FOUNDERS OF GERMAN GREATNESS



The hero-emperor of Germany in the Middle Ages was Frederick Barbarossa, whose name means red beard. He was elected king of the Germans at a time of unrest, because he was a strong, brave man; and later the pope crowned him Holy Roman Emperor. This picture shows Barbarossa being proclaimed king of the Germans.



During the Middle Ages, the knights who lived in the strong castles of Germany became very powerful, and did just as they liked. When Rudolph of Hapsburg, the ancestor of the present Austrian Emperor, was elected Emperor of Germany in 1273, he determined to stop the robberies of these knights and to break their power, and here we see him condemning some robber-knights who have been captured and brought before him.

Let us see how one of the strongest popes treated one of the weakest emperors. It was about the time when the Conqueror was "settling" England.

The priest Hildebrand had been so popular, toiling with all his might to set right the wrong things in the Church, and to make it strong and pure, that the people of Rome rushed into the church at the funeral of the pope who had just died, shouting: "St. Peter wills Hildebrand to be pope!"

THE COMING OF HILDEBRAND AS POPE GREGORY, AND AN EMPEROR'S QUARREL

The unwise ruler of Germany, Henry IV., defied this new pope, called Gregory VII. and his reforms, appointed bad men to high posts, and finally sent out a message to the world declaring Gregory to be pope no longer. Gregory answered with the terrible punishment of excommunication, which meant that the emperor was put out of the Church, and no priest might minister to him.

After a time Henry gave in and crossed the Alps, and then on to the Apennine Hills, at Canossa, where Gregory was staying, to beg for pardon. It was the depth of winter, and Henry had to wait about for three days in deep snow, barefoot, and in a miserable thin shirt, shivering till the pope chose to see him and forgive him.

Of a very different type was the hero-emperor Barbarossa, Frederick of the Red Beard. His strong, pleasant, smiling face seems to stand out across the centuries, and many are the stories of his bravery and endurance, and how he tried to make the empire complete and independent.

HOW THE QUARREL BETWEEN THE KINGS AND THE POPES ENDED IN VENICE

Five times he crossed the Alps, and had many struggles with the popes. But, strong as he was, he, too, had in the end to give way. In that twelfth century there were violent disputes for ever going on between the Church and the Christian rulers of Europe. In the history of England, we have read, elsewhere, of the tragic death of Thomas à Becket at Canterbury, and the penance of the king. Seven years later, the long contest between the Bishop of Rome and the Emperor of Rome also ended in victory for the Church. The opponents were persuaded to meet together in Venice, the beautiful and

independent city at the head of the Adriatic Sea. Three slabs of marble are shown to this day in the porch of St. Mark's—the lovely cathedral shown on page 621—as the spot where the greatest prince of the age, Barbarossa, knelt to kiss the pope's foot, and receive in return the old man's kiss of peace. It must have been a bitter moment for the emperor—Emperor of Rome merely in name, as he said—for the act of submission meant giving up the desire of his life. Later stories, not founded on fact, but due to the imagination of poets and painters, say that the pope set his foot on the neck of the kneeling emperor, saying: "The young lion and the dragon shalt thou trample under foot." In answer, the imperial "footstool" muttered under his red beard: "Not unto thee, but unto St. Peter be this honour." Any way, the tellers of the story understood the strife of the times and the character of Barbarossa.

THE OLD TIMES IN THE OLD TOWNS OF GERMANY

His last effort was to join Richard of the Lion Heart in the Third Crusade to recover Jerusalem from the Moslems. The great emperor was drowned while crossing a river in Asia, and he was buried in the sandy desert. But the old German poets have kept his memory green in song and legend, and the hope lived on that he would come again to help his people in time of need.

In the time of the Crusades the power of the nobles in Germany was very great. They held their lands on the same feudal plan as in France and England, and the peasants were very poor and wretched. Fine towns with strong walls began to rise over the country in order to resist the foes from without, and by degrees churches and universities, good houses and halls, were built, many of which have survived.

Germany to-day is famed for her splendid old towns. Some of these towns bought privileges and freedom, as did the French towns, and helped to keep alive the spirit of Hermann through the dark years. Eighty cities banded together to form the Hanseatic League; the chief ones were Lübeck, Hamburg, and Bremen. They had a settlement in London, where they had many special rights which increased their trade and wealth. The trade of the Baltic was in

their hands, and they even made war on their own account, being strong enough to withstand not only the nobles, but pirates at sea and robbers on land.

The robber knights who lived in the castles still crowning many rocky hills were a terrible hindrance to trade and farming in lawless times. The stories of how they sallied forth, attacking merchants at the fords or bridges, and seizing the newly-gathered crops, are most exciting. The knights of the castles were not all robbers, for on them depended the keeping of the roads and the tow-paths, and the entertaining of travellers before there were any inns.

RUDOLPH OF HAPSBURG, WHOSE FAMILY RULED THE EMPIRE 600 YEARS

An emperor who stands out from a time of universal confusion is Rudolph of Hapsburg, who became the founder of the Austrian House of Hapsburgs, in whose family, with some exceptions, the imperial crown remained for about 600 years.

Austria means the East Land, and the duchy gradually grew and spread, with many a change as the kaleidoscope turned, chiefly along the splendid Danube river, which rises near the Rhine in the Black Forest and flows across Bavaria, Austria, and Hungary on its way to the Black Sea. The brave mountaineers of the Alps had to league together against the Hapsburgs, as we learn from the story of Switzerland.

The energetic, intelligent, noble-hearted Maximilian I. was a Hapsburg, and he married the heiress of Burgundy and the Netherlands. Their son became Philip I., King of Spain, as he married the daughter of Ferdinand and Isabella, of whom we read on page 37.

It has been said that Maximilian stands as a boundary stone between the old times and the modern. We have already seen in the story of England and France how everything began to expand and change during this age of Columbus.

THE GREAT PART THAT GERMANY PLAYED IN GREAT WORLD-CHANGES

While the discovery of the compass put into men's hands a guide by which to sail in unknown seas, the invention of printing and the spread of learning made men think and study. Germany has a proud share in this advancement. It was a German who discovered how to make paper out of rags; it was a German

who first thought of printing with movable letters; it was a German monk who set all Europe in a blaze by preaching against the Church's wrong-doings.

The emperor at the time was Charles V., the grandson of Maximilian, often called a second Charlemagne, from the greatness of his dominions; for by inheritance he added to the German states, Spain, the south of Italy and Sicily, and the Netherlands, as well as colonies in the New World. It was an empire on which the sun never set. Early in his reign there was a terrible insurrection of the people, called the Peasants' War. They burned castles and monasteries, as did the peasants of France about 300 years later, and for much the same reasons—the grievous and unfair taxes, and the bitter oppression under which they suffered. This war was scarcely over when all Germany was roused by Martin Luther burning publicly the deed of the pope that excommunicated him for his teaching.

Charles V. was against Luther, but many of the princes supported him; and the protest they drew up, saying they could not tolerate in their lands the following of a religion which they held to be against God's Word, gained them the title of Protestants, the name since given to all those who will not accept the authority of the Church of Rome.

THE TERRIBLE STORY OF THE STRUGGLE FOR FREEDOM IN RELIGION

The Germans owe their first readable translation of the Bible in their native tongue to Luther, as we owe ours to Wyclif; and the invention of printing, slowly working from improvement to improvement, made it possible to send it broadcast among the German homes all over the land, in the fine cities, in the beautiful valleys of the hill countries, in the broad north plain.

The story of how religious liberty was gained in France and in Great Britain is sad enough. In Germany, thirty years of war caused unspeakable ruin and misery to the country before people gained the right of following the religion they believed to be the true one. There were the quarrels between Catholics and Protestants, and the quarrels between different kinds of Protestants. The confusion was terrible, because the princes of the various states did their best to insist on their

people believing, or disbelieving, as they did themselves. Thousands of people left their homes in Bohemia, rather than give up their faith. It was here, years before, that John Huss had bravely stood up for the truth, and died a martyr's death at the stake. The rulers in the North German States seized the estates of the bishoprics for themselves; the Hapsburgs supported the Catholics, as did Bavaria, and civil war spread all over the land. For a short time the leader of the Protestants was Frederick, count of a province on the Rhine, who married Elizabeth, the daughter of James I. Their trials and hairbreadth escapes, and their flight to Holland, are full of interest. Their portraits, and that of their daughter, are in the London National Portrait Gallery. It was through that daughter, Sophia, who married the Elector of Hanover, that the princes of that country had a claim to the British crown.

GUSTAVUS ADOLPHUS, THE FAMOUS SNOW KING WHO WENT TO THE WARM SOUTH

But the long war was by no means over when the Protestants suffered this check. Princes all round came to their help. Christian IV. of Denmark, whose kingdom was on the peninsula between the Baltic, and the North Seas, and the British king, James I., helped; but chief of all came the Swedish king, Gustavus Adolphus, in his leather jerkin, landing his army in Pomerania.

The courtiers of the Catholic emperor laughed at the Snow King, as they called him, saying he would melt as he came to the warmer south. But they found that the king's power was more like a snowball, which gathers as it rolls.

The greatest generals against Gustavus were Tilly and Wallenstein. Tilly could boast that he had won thirty-six battles. The skilful and energetic Swedish king prevented his gaining the thirty-seventh. Gustavus was killed at the battle of Lützen, near Leipzig, in which Wallenstein was defeated. Wallenstein, an extraordinarily clever and strong man, was a traitor, and was going to tear the crown from the emperor, and deliver his troops to the enemy, when he was assassinated. For a long time success was now on one side, now on the other. When the emperor seemed likely to be too powerful, France cruelly burnt and

plundered the beautiful Rhine country. At last a peace was arranged, the Peace of Westphalia, for the country was quite exhausted. France took Alsace, Sweden claimed Pomerania, Switzerland and Holland became independent. The greater German princes were left absolute masters in their own states, so that the fiction of empire became more shadowy than ever. Catholics and Protestants were to have equal rights and freedom of worship, and the Protestant princes were to keep the Church lands they had taken.

THE BITTERNESS OF A DESOLATE LAND AT THE CLOSE OF THE WAR

The number of people in the German states at the beginning of the war was between sixteen and seventeen millions; at the end there were not quite four millions. Bitter want was felt in the desolate land; whole towns and villages and thousands of churches and houses were destroyed. Cornfields were trampled down, trade was ruined, and the people were dull with misery. This peace was made a few months before Charles I. was beheaded at Whitehall.

After ten years war broke out again. The German princes, some dissatisfied, some selfish, some greedy, listened to the wily words of Louis XIV., who had determined to make the Rhine the eastern boundary of his kingdom, and in the struggle that followed Strasburg was lost, and the rich province of Lorraine went to France. The treaties that settled the wars of this time were called by the German people the peaces of Take-away, Tear-away, and Unright, because Germany lost something by each one.

HOW THE TURKS WENT TO VIENNA AND MADE 87,000 PEOPLE SLAVES

A terrible thing happened now to Vienna, the Austrian capital. The Turks who lived beyond Hungary poured through that province and laid siege to the fine, strong city, taking it in two months' time. They blew up the walls, and sent 87,000 people into slavery. At last a neighbouring king, the King of Poland, came to the rescue and drove away the Turks. In the tent of the Turkish general were found the letters of Louis XIV., stirring them on to attack the empire. Pursuing his plan of raising up enemies in distant parts, to keep the German soldiers busy away from the Rhine,

KINGS WHO MADE PRUSSIA GREAT



The first king of Prussia, Frederick I., was a good ruler, and so that his subjects should be able to read the Bible, he started thousands of schools in the villages and compelled the children to attend. Here we see him visiting a school and examining the children. Frederick I. crowned himself king, and Frederick the Great said of this event: "It was as though he told his successors, 'I have won for you a title; make yourselves worthy of it.'"



During most of his life, Frederick the Great was engaged in fierce wars which threatened to destroy his kingdom, but by brilliant generalship he defeated his enemies and made Prussia great. When not fighting, the king used to travel about his kingdom and talk with the people, encouraging them to make roads and canals and otherwise improve their country. This picture shows him on his travels, his subjects giving him a welcome.

he also stirred up the Swedes to attack Brandenburg, on the Baltic. The ruler of this province, Frederick William, the "Great Elector," and Prince Eugene of Savoy were the chief support of the emperor in these French wars. Prince Eugene was a very little man, with great military power, and a wonderful command over his soldiers.

THE WONDER-HOUSES OF THE GREAT GERMAN NOBLES

When the next great war arose in Europe about the succession to the throne of Spain, Eugene and the Duke of Marlborough commanded the allied forces of Holland, England, and Portugal, which backed the emperor and the Electors of Hanover and Brandenburg. The two great generals beat the French in Germany, in the Netherlands, in Italy. The names of most of the battles are familiar to us, and we know who fought at Blenheim, at Ramillies, at Oudenarde, and Malplaquet.

It has been said by a Belgian traveller in Germany, speaking of the times that followed the wars with France, that none of the princes could pass muster who had not his Louvre or Versailles, meaning that there was then a fever for building and copying France in every possible way. Because Louis XIV. created Versailles out of a sandy waste, one noble built a village on the top of a bare mountain, another formed a palace in the depths of a forest, another placed a great fortress where there was nothing to defend. There were about two hundred independent states at this time, and many of them cared little for the good of the country. The peasants, as in France, were ground down to pay for the splendour and luxury that went on in the courts and fine palaces.

HOW FREDERICK THE GREAT SPENT 40 YEARS IN BUILDING UP HIS KINGDOM

There was one court, at any rate, where there was no luxury. Brandenburg had absorbed the neighbouring state of Prussia, and its rulers were now Kings of Prussia. All the money that could be gathered was spent on the army, recruiting the finest men, drilling and training them. When Frederick William the Great came to the throne, he spent forty years working hard for his kingdom: rebuilding, draining, making roads and canals, seeing that farmers had grain to sow, adding to his

dominions whenever there was a chance. From his time onward it became quite clear that sooner or later Prussia would come to the front and lead the rest of the states. By his power and perseverance he got the best in the Seven Years' War against Austria and France.

At this time Austria was under the rule of Maria Theresa, the mother of Marie Antoinette of France. Frederick gained Silesia from her, and she also lost other parts of her dominions. She was a brave and determined woman, and when hard pressed she had to fly from Vienna to Presburg, in Hungary. Hungary had been joined to Austria before the Thirty Years' War. There, in Hungarian costume, she appealed to the nobles, holding her baby boy in her arms. In answer they enthusiastically flashed out their swords, shouting together: "We will die for our sovereign, Maria Theresa." The flames of the Seven Years' War spread, as we have seen on page 1008, all over the world, and from this time Prussia has been an important power.

Some thirty years after the treaty which ended the Seven Years' War and confirmed Britain's position in Canada and India, war broke out again.

HOW THE WARS AGAINST NAPOLEON HINDERED THE GROWTH OF PRUSSIA

Roused by the terrors of the Revolution, and to avenge its chief victims, Austria and Prussia joined together and advanced to France itself, to the great rage of the French people. For the next ten years France was defending herself against the attacks of Europe, and the progress of Prussia was stayed for a time by these wars. Austria was first fought in Italy, where Napoleon gained many battles with great rapidity. In 1805, the army, intended for the invasion of England, was turned against Austria. The nations had now to defend themselves against the ambition of Napoleon, who, for a time, carried all before him. Thirty thousand Austrians had to surrender at Ulm. Vienna was taken, and the Austrians, and their allies, the Russians, were defeated at Austerlitz.

The next year the Emperor Francis II. laid down the crown of the Holy Roman Empire, so long a mere name, but still a link with the past. He had already taken the title of Emperor of Austria, a name that his successors still bear.

The next story of Germany is on 2575.

NAPOLEON AT THE BATTLE OF WAGRAM



This picture shows Napoleon viewing his troops at the battle of Wagram. Here, near the city of Vienna, on July 5-6, 1809, the French defeated the Austrians under Archduke Charles, but the victory was dearly bought, for the loss on each side amounted to nearly 25,000 men. The picture was taken from the well-known painting by H. Vernet.

WHAT THESE STORIES TELL US

IF you look at a list of the rulers who have ruled over England, you will find among them the names of five queens, though one of the five reigned jointly with her husband, and we think of him as king much more than of her as queen. But the other four are all famous, and in the reigns of three of them England grew very great both in war and in peace; so that there are no kings of whose reign Englishmen think more proudly than of those of these three queens. Besides these there were two more queens who were proclaimed queen of England, though they never really ruled; and there were also several famous women, who were queens only because they were the wives of English kings, who yet did things for which their names are remembered. Therefore they must not be left out of the story of the queens of England, and in these pages we read of some of the chief of those who have held this proud title.

THE QUEENS OF ENGLAND

KING HENRY I. of England, the Conqueror's youngest son, had a son named William, and a daughter who is sometimes called Maud, and sometimes Matilda; but generally she is known as the Empress Maud, because when she was a young girl she was married to the German emperor, although after he died she was married again to the Count of Anjou. But when Prince William was drowned in the White Ship, the king, having no other son, was determined that his daughter should reign after him; and twice he caused all his nobles to swear allegiance to her, and to promise that she and none other should be queen.

Nevertheless, when he died, the nobles were not minded to be ruled over by a woman; moreover, they had no liking for her husband, Geoffrey of Anjou. Therefore they made her cousin, Stephen of Blois, king, whose mother was the daughter of the Conqueror; although he, too, had sworn fealty to Maud.

Yet she would not yield up her claim to the throne, and she came to England, and some of the barons fought on her side against Stephen, and others fought for him. And at one time it seemed that she would gain the upper hand, for Stephen was taken prisoner, and Maud was proclaimed queen by the title of "Lady of England."

CONTINUED FROM 2476



Yet she proved so proud and so harsh that, while she was in London, the people rose against her, and she had to flee for her life; and the war broke out again between her and Stephen's supporters. And afterwards, when she was at Oxford, she was so hard pressed that again she had to flee by night across the snow, clad in white so that she might not be seen. However, at last an agreement was made that Stephen should reign till he died, and that after him Maud's son, Henry, should be king instead of Maud herself becoming queen again.

Eleanor of Aquitaine, who was the wife of Maud's son, Henry II., was celebrated for the love she had of minstrels and troubadours, but chiefly for the quarrelling there was between her and her husband. For he had wedded her for the sake of the broad lands of Aquitaine, and not because he loved her; so that it was said of her that she did to death a lady who was called Fair Rosamund, out of jealousy, causing her to take choice whether she would slay herself with a dagger or drink of a poisoned bowl, since she thought that King Henry had more goodwill towards Fair Rosamund than towards herself, who was his wife.

Moreover, when King Henry and his sons fell out and warred against each other, Eleanor, the queen, had no small share in stirring up the

young men to rebel against their father. Nevertheless, when King Henry was dead she played an ill part no more. But first, when her son, Richard I., was king, she sought to restrain the ill-doings of Prince John, who plotted against his brother while Richard was at the wars in Palestine, and was held prisoner by the Duke of Austria. Yet when Richard was set free and came back to England she prayed him to pardon John; and when John himself became king after Richard she gave him good counsel; so that her latter days atoned for the ill she had done before.

WHY CHARING CROSS IS CALLED CHARING CROSS UNTO THIS DAY

Now, after her, there is nothing to tell of the wives of Richard and John, and of Eleanor of Provence, the queen of Henry III., only that she brought to England in her train foreigners who were her kinsfolk, who wrought evil. But Henry III.'s son, Edward, who became Edward I., married a third Eleanor, a princess of Castile. And of her it is told that when Edward went on a Crusade to Palestine, before he was king, she went with him; and when an enemy tried to murder him, by striking him with a poisoned dagger, she saved his life by setting her lips to the wound, and sucking the poisoned blood from his arm, though she could not tell whether she might not thereby lose her own life. And Edward held her always in great love and honour; and when she died, in the Midlands, her body was brought to London with much pomp and mourning; and at every spot where the bier rested on the journey he caused a fair cross to be set up in her memory, one of which was at the village of Charing, and that is why the spot is called Charing Cross to this day.

THE "SHE-WOLF OF FRANCE," QUEEN PHILIPPA, AND MARGARET OF ANJOU

Edward II. took as his wife Isabella, the sister of the King of France, who was so evil that she has been called the "she-wolf of France," of whom we need tell no more. But after him Edward III. married Philippa of Hainault, a very noble lady. For, first of all, when he was at the wars in France, she, being in England, gathered the army which routed the Scottish invasion at Nevill's Cross; and then she went to the army of the king, who was

besieging Calais. Now, he besieged it so straitly that the citizens were forced to submit, sending him their chief men who had urged them to resist him, with ropes about their necks as though they had been rebels who deserved hanging. But when Edward was about to condemn them to death, Philippa pleaded for them, as we read in the history on page 748, saying that the king had promised her a gift, but he could give her none which she would so prize as the lives of those brave men. Thus she saved their lives, though none else had ventured to cross the will of the angry king.

The next queen of note was Margaret of Anjou, the wife of the hapless king Henry VI. She brought trouble upon England, for, seeing that the king was so feeble, she tried to rule in his place and to keep her own favourites in power. And because there was strife between these favourites of hers and the king's cousin Richard, Duke of York, the wars broke out which we call the Wars of the Roses; since the House of York took the white rose for its badge, and the House of Lancaster took the red rose for theirs.

HOW MARGARET CROWNED RICHARD WITH A PAPER CROWN AND KILLED HIM

Presently Richard made claim that he was the rightful king of England; and this was chiefly because the queen, Margaret, sought his destruction so bitterly, and that of all who had made common cause with him. Now, Margaret overthrew Richard at the battle of Wakefield, and took him prisoner, and set a paper crown upon his head in mockery, and then had him beheaded. But afterwards his son, Edward IV., overthrew the Lancastrians, and made himself king. Nevertheless, Margaret went on stirring up wars, till she was finally overthrown at the battle of Tewkesbury, and her son was slain, and, as all men believed, her husband, Henry VI., also; and after that she could do no more.

But when Henry VII. ended the Wars of the Roses for good and all, he, being accounted the head of the House of Lancaster, took as his wife the Princess Elizabeth, the sister of the princes who had been murdered in the Tower, who was the head of the House of York; so that when a son was born to them the two factions of York and Lancaster

both saw that he was certainly the rightful heir to the throne. But of Elizabeth we know that she was a good queen, and while she lived Henry never showed himself so sordid and unlovely as he did in his later years.

THE SIX UNHAPPY WIVES OF KING HENRY THE EIGHTH

As for Henry VIII., he married six times ; and the fate of each one of his wives was unhappy. The first was Catherine of Arragon, who was a true wife to him ; and, like Philippa, she gave good aid in sending the army which overthrew the Scottish invaders at Flodden Field when the king was at the French wars. Yet Henry wearied of her, and declared that he did not count her in truth his wife, because first she had been wedded to his brother ; and thereby he cast shame upon her. And when he had married Anne Boleyn in her place, he wearied of her, too, and found excuse for saying that she had been guilty of treason, and so had her beheaded. Now, Catherine's daughter was to be Queen Mary, and Anne's daughter was to be the great Queen Elizabeth. Henry's third wife was Jane Seymour, who was the mother of King Edward VI. ; and of the other three wives there is nothing that need be told.

But when Edward VI. died, being yet a boy, the crafty Duke of Northumberland had planned to make queen neither of Henry's daughters, but a niece, the Lady Jane Grey, whom, being but a young maid, the duke had married to a son of his own ; and he pretended now that she was the lawful queen, saying that what the judges had decided about Queen Catherine and Queen Anne shut their daughters out of the right to become queen.

HOW LADY JANE GREY REIGNED FOR TEN DAYS AND WAS LED OUT TO DIE

Now, this Lady Jane was a wonder for learning, yet very sweet and innocent ; and the duke and his fellow-plotters came to her and told her that she was indeed the lawful queen. She, being so young, had no thought but that this queenship of a great nation was a heavy burden which had been laid upon her by God's will, so she might not refuse it ; and Northumberland's friends proclaimed her queen. Yet she was queen for only ten days ; because all men knew that Mary was indeed

the lawful queen, and after the first they rallied to her. And when the duke's friends saw that it would be vain to resist Mary, Lady Jane's kinsfolk came to her, and told her she was no longer queen, whereat she rejoiced greatly. Still, Mary kept her a prisoner, fearing to set her free lest there should be new plots to make her queen again.

And there were new plots, partly because Mary was a Roman Catholic, and the Protestants feared her, and partly because she wished to marry the Prince of Spain, and many men feared that so the Prince of Spain would become master of England. Therefore a rebellion broke out, led by one Sir Thomas Wyatt ; and the rebels came near to capturing London. Yet Mary, being a brave woman, gave courage to her followers, and they overthrew Wyatt. And after that it was thought that if there was to be peace in England innocent Lady Jane must die, not for treason of her own, but because others might make her claim to the crown an excuse for treason. So her pure, short life was ended by the headsman's axe.

THE TERRIBLE TIMES THAT BEFELL ENGLAND UNDER QUEEN MARY

And now great trouble came upon England and upon Mary herself. For before she became queen she had been harshly treated, first by her father, King Henry, for her mother's sake, and then by her brother Edward's counsellors for her religion's sake. And now Philip of Spain, her husband, being younger than she, showed no love for her ; and she was zealous to turn England from Protestantism back to the Roman Catholic religion, believing that all "heretics" would be condemned in the life to come, so that she would be doing a work acceptable to God if she saved the souls of many thousands by burning the bodies of some hundreds.

Therefore, in the four years of her reign that were left, many martyrs of Protestantism perished in the flames ; and this thing was so hateful in the eyes of the English people that it made Protestants all the more zealous, and they called the queen "Bloody Mary" because of the great persecution. So there came to her nothing but sorrow, and at the last a great blow, only a few months before she died. For England

went to war with France, because France was at war with Spain; and in the war the French took the town of Calais, which the English had held for over 200 years. And this so grieved Mary that she said that when she died the word Calais would be found graven on her heart.

THE REIGN OF ELIZABETH, WHEN ENGLAND REFUSED TO BE RULED BY THE POPE

When Mary died, she was succeeded on the throne by her half-sister Elizabeth, the daughter of Queen Anne Boleyn, and her reign was one of the most glorious in all English history. For when she began to rule it seemed that England had become so weak, and Spain had grown so mighty, that the Queen of England would be obliged to do whatever the King of Spain required of her, and that the land would be little better than a province of Spain, and the Protestant religion would be crushed altogether; yet when she died the power of Spain was broken, and English ships sailed all seas with assured knowledge that none could match them in fight, and Englishmen had learned to believe that they were destined to form the greatest nation on the face of the earth. And in her reign England became, once for all, a Protestant land, and the chief of all the countries which refused any longer to obey the Pope.

In her day there lived many of the greatest of all Englishmen: William Shakespeare, whom many count the greatest writer of all time; and Edmund Spenser, who is called the "Poet's Poet"; and Francis Bacon; and Philip Sidney, the flower of perfect knight-hood; and the wise statesmen Burleigh and Walsingham; and Francis Drake, and Martin Frobisher, and many another captain whose fame has rung through the world; and Walter Raleigh, who taught Englishmen to build a New England beyond the seas.

THE WIT AND VANITY AND CHANGING MOODS OF "GOOD QUEEN BESS."

Now, Elizabeth had faults enough, but she loved the land and the people over which she was queen, and she desired above all else that England should be great and prosperous. Moreover, she was not only keen of wit herself, and skilled in the craft of statesmanship, but she kept about her always wise counsellors, though for her part she

seemed always to show more favour to others who were not good advisers, but paid her pretty compliments; and she drove the wise men near to despair by her changing moods and her trickery.

Yet she could judge well enough between good counsel and bad, and always took care that there was some way of escape when she played dangerous pranks, as was often her way, and so she could return in time to the wise course and the wise counsellors. Thus she went always her own way, and not the way that Philip of Spain would have appointed for her, keeping always the fear of France before Philip, and the fear of Spain before France, and before each of them the fear that England would make close alliance with the other.

Meantime, her sailors were learning to manage their ships with such skill as had not before been known, so that, when at last Philip sent against her the mighty fleet called the Armada, it met with utter overthrow, and England became the mistress of the seas. How she dealt with Mary Queen of Scots, and the doings of some of the great men of her day, is told in another place. But to Englishmen she will be "Good Queen Bess" for ever, because she loved her people and was loved by them.

MARY, WHOSE FATHER WAS DRIVEN FROM THE THRONE TO MAKE WAY FOR HER

When Elizabeth died, having reigned for nearly five-and-forty years, the heir to the throne was King James of Scotland; and under the Stuart kings England and Scotland were united, because they had one king, but in other things they were still separate countries. Of their queens we need not speak here. But when James II. ruled so ill that the country would endure him no longer, they called his daughter Mary to be queen in his place, while her husband, William of Orange, was to be king. But William was, in truth, the ruler, though her name stands beside his in the list of kings of England. There are some people who blame her for consenting to let her father be driven out, and to take his place; yet she saw that for England there was no other way, and while she lived she helped her wise husband as she could. Then, since they two had no children, when William died, Mary's sister Anne became queen.

THE CHILDREN'S PORTRAIT GALLERY OF FAMOUS QUEENS OF ENGLAND

These pictures are specially interesting because, while some of them show the queens wearing their crowns, all of them show the picturesque dresses worn by the highest women in England at various times of her history ; so that we can see in these pictures the changes in dress that have taken place from age to age.



ELEANOR OF AQUITAINE, QUEEN OF HENRY II.
Born about 1122 ; Became queen, 1154 ; Died, 1204.



ELEANOR OF CASTILE, QUEEN OF EDWARD I.
Born, 1244 ; Became queen, 1272 ; Died, 1290.



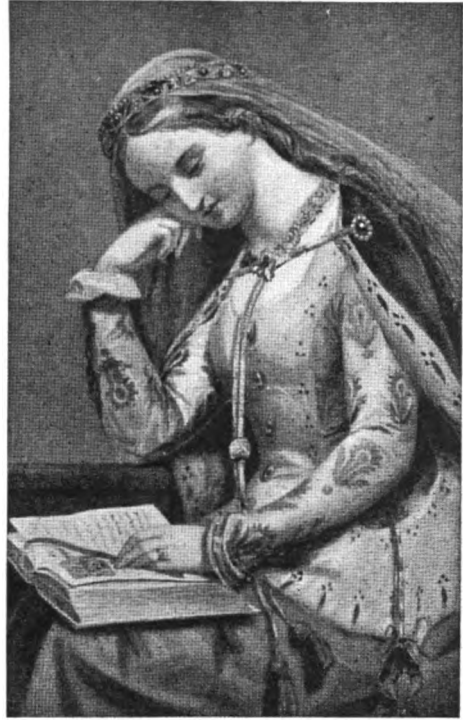
ISABELLA OF FRANCE, QUEEN OF EDWARD II.
Born about 1295 ; Became queen, 1308 ; Died, 1357.



PHILIPPA OF HAINAULT, QUEEN OF EDWARD III.
Born about 1314 ; Became queen, 1327 ; Died, 1369.



MARGARET OF ANJOU, QUEEN OF HENRY VI.
Born about 1429; Became queen, 1445; Died, 1482.



ELIZABETH OF YORK, QUEEN OF HENRY VII.
Born about 1466; Became queen, 1487; Died, 1503.



CATHERINE, 1ST QUEEN OF HENRY VIII.
Born, 1485; Became queen, 1509; Died, 1536.



ANNE BOLEYN, 2ND QUEEN OF HENRY VIII.
Born about 1506; Became queen, 1533; Died, 1536.



JANE SEYMOUR, 3RD QUEEN OF HENRY VIII.
Born about 1509 ; Became queen, 1536 ; Died, 1537.



LADY JANE GREY, THE UNCROWNED QUEEN
Born, 1537 ; Declared queen, 1553 ; Died, 1554.



QUEEN MARY THE FIRST
Born, 1516 ; Became queen, 1553 ; Died, 1558.



QUEEN ELIZABETH
Born, 1533 ; Became queen, 1558 ; Died, 1603.



HENRIETTA MARIA, QUEEN OF CHARLES I.
Born, 1609 ; Became queen, 1625 ; Died, 1669.



MARY II., QUEEN OF WILLIAM III.
Born, 1662 ; Became queen, 1689 ; Died, 1694.



QUEEN ANNE
Born, 1665 ; Became queen, 1702 ; Died, 1714.



QUEEN VICTORIA
Born, 1819 ; Became queen, 1837 ; Died, 1901.

Now, the reign of Queen Anne, though it lasted only for twelve years, is famous for two chief reasons.

HOW ENGLAND ROSE IN GREATNESS IN THE REIGN OF QUEEN ANNE

The first is that in the wars with King Louis XIV. of France, against whom William III. had fought stubbornly, the English armies and their allies were led by one of the most skilful soldiers of all time, the Duke of Marlborough, about whose great victory at Blenheim there is a poem on page 198 of this book. The war was going on because Louis wanted to make his grandson King of Spain, while the Austrian emperor wanted his son to have the crown instead, and because Louis also wanted to make the English take back the son of James II. to be their king. The English fought on the side of the emperor.

The second reason why Queen Anne's reign is famous is that, as in the reign of Elizabeth, so now there were a number of very famous English writers, such as Joseph Addison and Alexander Pope and Jonathan Swift; and men of letters were made so much of that this time was called the "Augustan Age" in England. Under Queen Anne, too, the Parliaments of England and Scotland were joined together, and the two nations were made one. Queen Anne herself was a kind-hearted lady; but she did not so much rule the land as set the example of letting those statesmen rule it in whom it seemed that the country trusted. Really, however, she was managed herself, first by the Duke of Marlborough's wife, Sarah, and afterwards by a lady called Mrs. Masham.

HOW PRINCESS VICTORIA CAME TO THE THRONE AT EIGHTEEN

Then, because none of her children grew up, but all had died before her, the British nation took George, the "Elector" of Hanover, for its king, instead of letting James Stuart come back. Of the wives of the four Georges, who ruled in succession, one, Caroline of Anspach, the queen of George II., was notable; for her husband knew that she was cleverer than he, and let himself be guided by her counsel, and she in turn knew that the Minister, Sir Robert Walpole, was still wiser, so that she counselled the king as Walpole advised.

But the rest of the queens we may pass

by, until we come to the grandchild of King George III., who came to the throne after two of her uncles had ruled.

This was Victoria, who died in 1901, having reigned for nearly sixty-four years, longer than any other king or queen of England.

She was a young maiden of eighteen when she began to reign; and soon after she chose for her husband a German prince, Albert. Their eldest son was King Edward VII., who reigned but nine years, and died in 1910, greatly mourned by all. Prince Albert, however, was not king, but only "Prince Consort"—that is, he had no power of his own in the government of England, though the queen might turn to him for counsel. But even so he had to be careful lest he should be charged with "interfering."

Now, although, since the time of Anne, it has been the statesmen rather than the kings and queens who have ruled our country, yet a monarch may do much good and much evil—and George III. did a good deal of both.

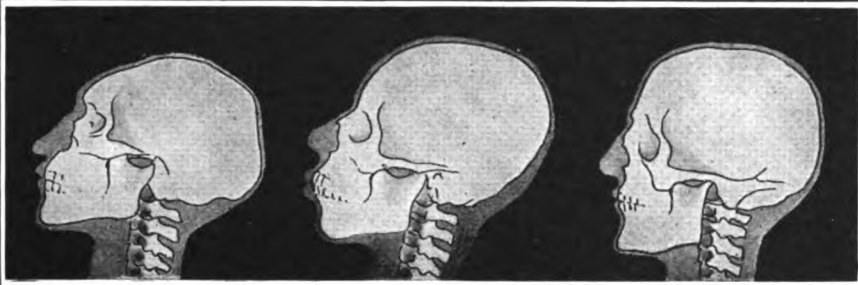
THE GREAT CHANGES THAT CAME ABOUT IN QUEEN VICTORIA'S REIGN

But Victoria's rule was good, because she knew well when it would be wise and right for her to urge her own views upon British Ministers and upon foreign rulers, and when it would be wiser to set her own views on one side.

And so again, as in the reigns of Elizabeth and Anne, the British Empire grew great and prosperous. The reign was one of peace; for though twice England had to fight for her power in India, and twice in Afghanistan, and once, in the very last years of her rule, against the Boers in South Africa, yet she had one war only against a European nation—the Crimean War against Russia. The colonies of Great Britain grew so that they have become great states; and there were many great writers; and men of science made wonderful discoveries, so that the face of the earth changed more in that time than in centuries before.

Therefore, many people think to-day that in ages to come Englishmen will look back upon the Victorian Era as one of the most glorious periods in all time, because of the spread of knowledge and the growth of Britain's rule.

The next stories of men and women begin on page 2591.



In animals the skull is all behind the face. These pictures show how in man the skull has doubled over in front to make room for the brain. The first is the skull of an Australian native, the lowest type of man, the second of a negro, and the third of a European, the highest type of man.

THE HEAD AND THE LIMBS

WE have read about the bones in general and their services to the body, and especially we discussed the backbone, upon which the whole body is built; and we saw that it is specially curved in human beings, so that, after the baby stage, we walk erect. Now, upon this backbone there is beautifully poised the head; and this contains the brain, where *we ourselves* really live, and from which issue the orders to the limbs, whereby our living and willing show themselves. The orders to the lower limbs, or legs, take us where we wish to be, and the orders to the upper limbs, or arms, enable us to do what we wish when we have got there. Now we must study the head.

If we look at a very humble back-boned animal, like the fish, or even at a much higher one, far nearer to ourselves, such as the dog, we see at once that the head is made of two parts. In front there is a part which is thrust forward, which we call the face. Its great business is to carry the most important organs of the senses—the eyes and the nose—much more important than the ears, which in the fish are very poor—and also to provide openings for the air—in the case of the dog—and another for the food to enter the body. Look at a greyhound, and you will see what I mean. And *behind* the face there is the other part of the head. This is rounded

CONTINUED FROM 2442



and rather large, and we call it the skull. It is the most important part of the whole skeleton, for it contains the brain. The brain of a fish is very small indeed, and its skull is small also; in the dog the brain is much larger, and so its skull is quite conspicuous. In the animals which come nearer to ourselves, the higher monkeys—usually called the man-like apes—the brain and the skull are much larger than in the dog. But even in the highest apes the skull is still *behind* the face.

Now, in ourselves the brain has become *enormous* compared with the brain of any animal, and room has had to be found somewhere for this great brain, which is, more than all things else, the thing which distinguishes our bodies from those of any animal. Room has partly been found sideways, so that our skulls stand out sideways from the neck very markedly. But the wonderful development of the brain in ourselves is by far the most marked in one particular part of it, which is its topmost part—topmost both because it is actually at the top, and because it does the highest kind of work, which is thinking. This topmost part of the brain has grown so large and so high that it has doubled over upon itself *forwards*, instead of standing straight up; and therefore the skull of mankind has had to grow forwards to hold

it. This means that the skull, which in the animals is entirely *behind* the face, has now grown over the face; and if we look at any man, woman, or child, we see at once something which shows this, the like of which cannot be found in any animal on earth, and that is the great forehead, the part of the head that—in every sense of the words—has “come to the fore,” as we say. So while we still have a great expanse of skull behind our faces, like all animals that have skulls at all, we have a great part—and that the most important of all, as it holds the highest and most *human* part of the brain—placed above the face. The whole growth and development of the body, as well as everything else, depends upon the brain; and so, if we look at a very young baby, we find that, though its brain has yet such a lot to learn, it is larger in proportion than any other part of its body, including its face.

A REMARKABLE THING ABOUT A BABY WHEN IT IS BORN

So, in a baby, the face seems rather absurdly small, tucked away “anyhow” *under* the big skull, which is actually the widest part of the whole body of a baby. If we look at ourselves and see how narrow the head is compared with the shoulders or the hips, we can scarcely believe that, when we were first born, the head was wider than either. But so it was, and so it has to be to hold a brain big enough to control and direct successfully the growth and development of the little baby's body, which cannot even sit up, much less stand, until it becomes the wonder and the master of the world.

We find that some parts of the earth are inhabited by a very humble kind of men and women, who not merely know less than we do, but are not able to learn as much as we do, even when they get an equal chance; and we notice that these people do not have high and broad and straight foreheads, as we do, but that their foreheads are low and narrow, and slope very sharply backwards, almost suggesting the humbler forehead of a dog. We have no more right to despise these people than we have to despise any other creature that God has made. To do so is to despise God. But we must understand that they are less able to look after themselves and to

protect themselves from evil things than we are, just because their brains are not so large as ours; and *therefore* a special duty falls on us, who have larger and better developed brains, to do right to these people, and not, for instance, to get rich by making slaves of them or to make slaves of them by selling to them alcoholic liquors which are unfit for any human being, or even a dog, to drink.

THE BRAIN IN ITS HOUSE AS STRONG AS A ROCK

If we understand how important the brain is, and that the skull is its house, we shall think it worth while to study the skull rather carefully. First of all, just a word as to its base, or under-surface. If we look at it, we notice two things. The first is that it is very strong, very thick, and made, in its greater part, of the densest and hardest bone in the whole body. Part of it is, indeed, called the *petrous* bone, from the Greek word for a rock, because it is so hard and strong. We use this same word when we say that a thing is petrified, or turned into a stony rock, and it is used in the Bible, where Simon was named Peter, the *rock*. The reason why the base of the skull is so tremendously strong is because of the great shocks it always has to bear. Every step we take—and far more so when we run or jump—means that a great shock runs up our legs, along the backbone, and so reaches the base of the skull. If this were not so strong as it is, it could not stand these constant shocks. As it is, only the most terrible accident will break it, and usually it is unbroken even when a man has had some awful fall from a height.

THE GREAT WONDER OF THE SKULL AND THE BRAIN

The second thing we notice about the base of the skull is that it is pierced with holes, small and large. They are so many and so confusing that it takes months to know them all—and then you forget most of them in a week! But there is one that nobody can forget, and that is the great hole we have already mentioned, through which the brain joins with, or runs into, the spinal cord. The other holes exist partly for blood-vessels to enter the skull and supply the brain with air and food, for veins to carry the used-up blood away from the brain, and for a host of nerves to travel to and from

the brain, and connect it with the face, the tongue, the lips, the nose, the eyes, the ears, the voice-box, and many other very important parts of the body.

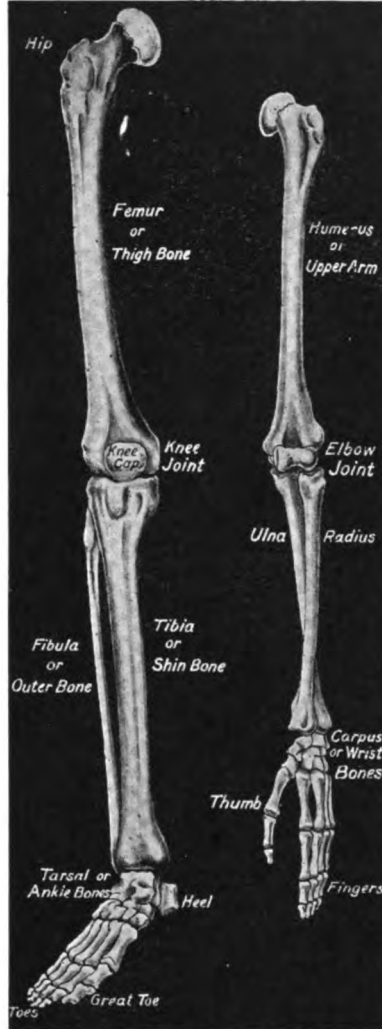
Only in one or two places do we find that the brain rests upon a floor of bone which does not protect it thoroughly. The wall of the space which holds the eyeball is, however, one of these places. It is possible for such a thing as the point of an umbrella very easily to pierce this thin plate of bone and so enter the brain at one of its most important parts. But the danger is not nearly so great as we might think; first, because the eye is greatly protected by the bony ring round it, so that a pointed thing must enter very straight if it is to pierce to the brain; and, secondly, because the eye itself is such a quick and sure guardian of its own safety, and can so rapidly, when it sees itself in danger, suggest to the brain that orders shall be given for the quick movement of the head to one side or the other.

The great vault of the skull is composed of a very special kind of bones. These bones are thin and beautifully curved, and they are most exactly jointed to one another. These are among the few cases in the body where bones are jointed together, but are *not* meant to move at these joints. This is the general rule in the head, and the only exceptions to it are the joints where the lower jaw hangs from the head, and the joints of

certain tiny little bones inside the ears, which carry the sound waves from outside on their way to the nerves of hearing. The bones forming the vault of the skull will always break sooner than be disjoined from one another, or dislocated, as we say.

These bony plates are remarkable, because they are *not* formed from gristle or cartilage, as most bones are, but from sheets of a fibrous material or membrane. When a baby is born, and for a long time afterwards, there are at least two places in its skull where this membrane has not been changed into bone, and where we can feel a "soft place." One of these is much bigger than the other, and most of us have been allowed, perhaps, very gently just to touch this soft place on the top of a baby's head. We can imagine how risky the existence of the brain would be if all its covering were made of a soft membrane, instead of good, firm bones. This soft place was long ago called the "little fountain" by the Italians. Sometimes, if we look at it, or lightly rest a finger on it—it is easy to find on a baby's head—we can see or feel it quickly rising and falling, rather like a fountain. The reason is that at every beat of the heart the brain and skull are

filled with a little more blood than is in them between the beats, and this raises the brain a little at each heart-beat under our finger. Sometimes a baby's pulse can be felt here when it cannot be felt anywhere else. Now,



Our legs and arms are made up of many bones, and here we see what these are like, and their different names. The knee-joint is the most wonderful joint in the body, although more easily injured than any other. The bones of the legs and arms are much alike, but the leg has an extra bone—the knee-cap.

if you have a little baby brother or sister, I don't want you, after reading this, to try to feel the little fountain for yourself, for you might press rather too hard, and babies are not born for us to try experiments on; but I want you to understand why every good mother or nurse is particularly careful to protect the head of a little baby from any injury.

We find that each of the bony pieces that make up the vault of the skull is gradually turned into bone from a point right in the centre of the piece of membrane that corresponds to it, and was there first. Even in the head of a fully-grown-up person these places can be felt as "bumps," for the bone is a little thicker there than it is anywhere else. If we could see the brain underneath, we should find no "bumps" in it to correspond at all to these bumps on the skull—they are merely places where the bone is a little thicker than usual. So it is utter nonsense and rubbish for this one reason, as well as for scores of other reasons, to pretend to tell anybody's character and future by feeling the bumps of his skull.

You will be able to feel five bumps at least on your own head. On each side of the forehead there is one, just at the "corner," as we might say. Then, at the opposite corners of the head—as if the top of the head were a flat, oblong thing—there are two others, and these are the places where the side bones of the skull started to be made. And in the middle line of the skull, behind and low down, is the sharpest bump of all. This is of a quite different kind, though it is a true bony bump. It is a sharp piece of bone, meant to hold the muscles and strong elastic fibres of the back of the neck, which hold up the head and prevent the chin from falling on the chest, as it does when anyone is very sleepy, and his brain forgets to tell the muscles at the back of his neck to keep on pulling.



The top of our skull seems to be one bone, but is really several bones, so beautifully dovetailed together, as seen here, that it is easier to break the skull than to disjoint the bones.

The skull of a human being is, however, very smooth indeed compared with some skulls. The skull of a cat or a tiger has many great ridges and crests and bosses of bone on it. The reason is that the tiger lives largely by the strength of its jaws. These need very large muscles to work them, and the muscles need large bosses and crests of bone on the skull for them to hold on to. Men are more muscular than women, and so, even in men, though their jaws are very weak compared with the tiger's, the skull is rougher than in women. A woman's skull is lighter and smoother and more rounded than a man's. It is also smaller, and holds a smaller brain. But a woman's brain is quite as big as a man's in proportion to the size of the body

it has to look after. That fact is not known by the kind of men who are always despising women—probably because those men's own brains are too small for them to learn much.

The only bones of the face that are very important are the jaws, which hold the teeth, and we have learnt something about them already; so now we



We can move a finger in only one or two directions, but this section of the hip-joint shows the wonderful ball-and-socket plan which enables us to move our legs in all directions.

pass on to the bones of the limbs. We have seen already that the limbs of all the back-boned animals that have limbs are made on the same principle, and to describe the bones of any one of them is to describe, almost exactly, the bones of any other. Perhaps the collar-bone differs most of any, but it is big in ourselves, and in those creatures which use their upper or fore limbs at all as we do. We need say no more about it, except that it lies very near the surface of the body, as we all know, and that it is very apt to be broken by a bad fall on the arm or shoulder.

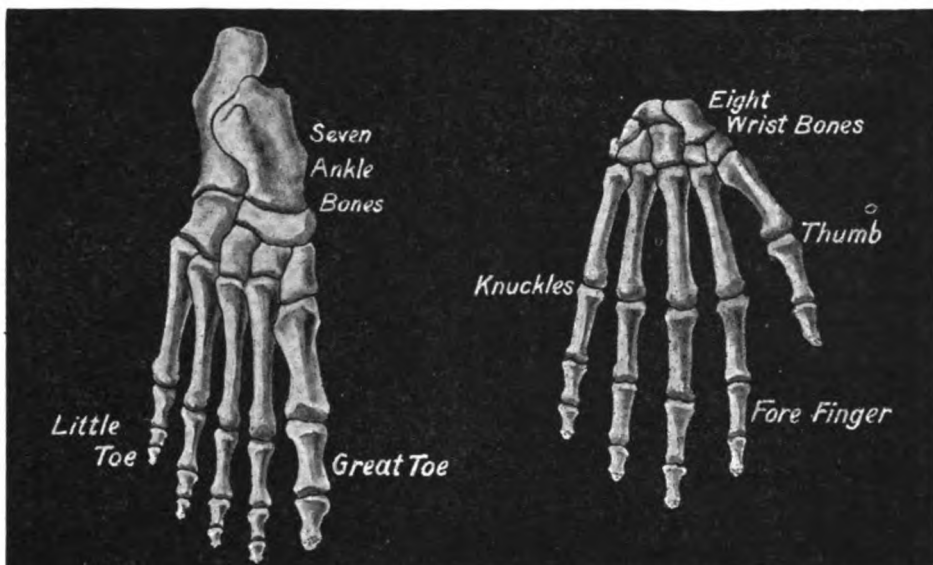
Much more important is the shoulder-blade, the great ridge on the back of which can be felt in anyone. It is mainly a rather flat bone, lying nicely moulded upon some of the upper ribs.

The most important part of it is a rounded socket into which fits the head of the bone of the upper arm. This makes a "ball-and-socket" joint, and the great feature of a ball-and-socket joint in a piece of machinery, and in our bodies, which are so much older than lifeless machinery—and have, of course, made all the lifeless machinery there is—is that it can move in any direction. You can move a finger-joint or the knee-joint in only one or two directions; but the shoulder-joint, and the hip-joint, which corresponds to it, are ball-and-socket joints—a very good thing for us.

Perhaps you may care to remember that the bone of the upper arm is called

find five little long bones (of course, you see why we call them long, though they are so little); and the first of these has *two* bones beyond it, making the thumb, while the other four have each *three* bones beyond them, making the four fingers. We sometimes talk of thumb and four fingers, and sometimes of five fingers, as when we say "five-finger exercises" for the piano; and it is rather confusing.

Everyone can see for himself or herself that the thumb has one piece of bone less than the other four parts into which the arm is split at its end. But have you noticed that the same is true of your great toe?



These are the bones of the foot and hand, each with the same number of bones. It is by the power of bringing the thumb opposite to the fingers, which no other creature possesses, that man can make so many wonderful things.

the *humerus*, not "humorous," remember. Some people say it is called that because it is near the "funny bone," but of course that is only a joke.

The forearm has two bones; they lie side by side when we stretch out the arm with the palm of the hand uppermost. When we turn the hand over on to the palm, the outer bone crosses over the inner bone. At the elbow both bones are jointed to the humerus, and a very wonderful joint that is, though not so wonderful as the knee, which, of course, corresponds to it.

Then comes the clever wrist, with its eight little pieces of bone all wonderfully jointed. Beyond the wrist we

In some creatures the fingers or toes are webbed; in the duck, for instance. But have you noticed that our fingers are partly webbed, too? Lay your hand on its back, and look at the length of the fingers, and then lay it back upwards, and look at their length again. Then you see that our fingers are a little webbed on the palm side. That makes the palm a little bigger, and helps to prevent things from slipping out of it between the fingers. The toes have the same arrangement.

A whole book, and a very famous one, too, has been written about the wonders of the human hand. Here we can only notice the greatest of them.

It is that the thumb can be *opposed* to the fingers, so that it is quite easy to touch the tip of the little finger with the tip of the thumb. The importance of this for the life of mankind is *enormous*. It means easy grasping, and that means *writing*, and many more things. In all the animals, except in those which are nearest to us, the thumb is not *opposable* any more than the great toe is in us, though the great toe is opposable in some animals, so that they can use their feet as well as their hands in climbing.

We have already read about the ribs and the breast-bone; so now we can pass to the last part of the skeleton, and that is the bones of the lower limbs, or legs.

Just as in the case of the arms there are certain bones that lie between the backbone and the long bones of the limb itself, so in the lower limbs we find certain bones of very great strength and importance, which are firmly joined together to form a sort of basin. This is called the *pelvis*, which means basin. It is built round the lower part of the backbone; and you can feel the edge of the basin in your side.

THE HIP-JOINT WHICH IS POWERFUL ENOUGH TO RESIST ALMOST ANY SHOCK

On each side of this basin, outside it, we find a very deep and very strong socket for the head of the hip-bone to fit into. This is very many times stronger than the socket the upper arm-bone fits into, because the hip-joint has to do with walking, and its strength has to be tremendous. It will stand very nearly anything before it will allow itself to be disjoined.

The thigh-bone, corresponding to the upper arm-bone, is the longest, biggest, and strongest in the body, and at its lower end is the knee-joint, the largest and most wonderful joint in the body, though, unfortunately, not quite perfectly fitted yet for a creature that walks upright, and therefore it is very apt to undergo injuries, and terribly liable to be attacked by disease.

The part of the leg below the knee has two long bones in it, like the forearm. But it is not necessary, or even desirable, that we should be able to turn the lower part of the leg right round, as we can do with our arms; and so only *one* of the two bones of the leg is jointed to the thigh-bone. That is the

shin-bone. The other one, which lies along its outer side, is very slender, and its upper end is simply jointed to the large and strong upper end of the shin-bone. You can feel the little head of this outer bone in your own leg, lying well below the knee-joint itself.

THE EXTRA BONE OF THE LEG THAT IS EMBEDDED IN MUSCLE

The leg also has an *extra* bone, the knee-cap; but this is quite peculiar, as we should expect when we remember that there is nothing of the sort over the elbow-joint. The knee-cap is a bone developed inside the strong rope, as we may call it, of the muscles of the thigh, as they pull upon the shin-bone. This rope, as it passes over the knee-joint, has the knee-cap embedded in it.

The bones of the ankle differ from those of the wrist, as they have such different work to do; and the most notable is the bone of the heel, on which such great strain falls when we stand or walk. But more remarkable than any one bone is the way in which the ankle-bones form an arch, which gives spring and grace to the gait. This arch is beautifully supported by the rope, or sinew, of one of the muscles on the outside of the leg, for this sinew runs right under the ankle and braces it up. Another sinew on the inner side does much the same, and the two together form a sort of stirrup to support the arch of the foot. If the muscles get flabby and weak, the sinews get lax and the foot is apt to become flat.

THE GREAT TOE JOINT AND HOW IT IS TWISTED OUT OF SHAPE BY OUR BOOTS

The bones of the foot exactly correspond to those of the hand. The foot, lastly, contains the most constantly abused joint in the body—the joint of the great toe. The bones of the foot are so arranged that the inner edge of the foot is meant to be straight, as it always is in a baby; and the great toe should move up and down in a straight line pointing forwards. We wear boots and shoes which turn the great toe outwards, and compel its joint to work thus twisted out of shape. People who have gout know the result—which is that this poor joint is more liable to cause intense pain and suffering than any other joint that we have in the body. The fault is not the joint's, but ours.

The next part of this is on page 2625.

WHAT THESE STORIES TELL US

OUR Golden Deeds this time are of war as well as peace. We read of a brave boy who saved the hamlet in which he lived by a daring adventure in the night, and of a heroic Indian soldier who saved a city for England by losing his own arms. They were both heroes. But not less heroic was Mary Jones, the little girl who walked across the lonely mountains of Wales to buy a Bible; or little Jeanne, a French peasant's daughter, whose life, though lived in her little cottage home, was as truly noble as any life lived in high places.

THE BOY WHO SAVED THE HAMLET

DURING the war with the Indians in the north-west 1855-6, one of the most daring acts was that of a boy named Goodman, fifteen years old—so young and yet so brave that his name is honoured by whites and even by the Indians themselves.

He belonged to a family who, when the eastern states of America became overcrowded, decided to go west, and, enchanted by the beauty of Paget Sound, settled upon its shores, north of California, on the Pacific coast. Our hero was but nine years old at that time, but he could use his bow and arrow and his rifle as well as many older than himself, and could manage the paddle as well as any Indian.

As time passed, many families from other states flocked to this part of the country, and the coming of the people so alarmed the Indians that they determined to drive out or kill all the white folk. The white folk knew nothing of this until men, women, and children were suddenly massacred, and the Indian tribe rose as a body against the white people.

Warned of the coming danger, Goodman sent his wife and his two little girls to a village some miles away, and remained with his son to guard the home. Nor was this a moment too soon, for the same night the Indians came, giving them barely time to escape and warn the hamlet. The people set to work speedily to build a fort and provision it, and all who could handle a rifle or a gun prepared for the defence, knowing that a cruel death would befall them if captured by the enemy.

CONTINUED FROM 2491



At noon the next day a fleet of war canoes appeared, and a fierce battle began; but though twenty times more than those in the fort, the Indians were beaten off at night and compelled to retire. They, however, had no idea of giving up the attempt. They retreated half a mile away, beached their canoes, lit the camp-fires, and began their war-dance. Young Goodman then formed a daring plan. He resolved to go alone to seize the enemy's canoes, knowing that the Indians could then do no further harm.

Leaving the fort after dark, he stole through the woods to the camp. The savages were so intent upon their dancing, and became so tired and sleepy, that they did not see the boy as he approached, and Goodman set to work to cut all the canoe ropes. Then, as the tide rose, he pulled them all afloat, and sent them out to sea.

Having cut all the canoes adrift, he got into one of them, tied another large one to it, and began to paddle to the fort. But hours were passing away, and the day began to break. As daylight dawned, the Indians awoke, to find their canoes drifting away. With a wild shout they sprang into the waves to seize them, but Goodman opened fire upon them with his rifle and drove them back. Making his way to the fort, he told his people what he had done, and was wildly cheered for his heroic work. The men went out and secured the large canoes, and the Indians, finding their fleet gone, beat a rapid retreat through the woods, not daring again to trouble the settlement.

THE NOBLE SIKH IN THE INDIAN MUTINY

DURING the dreadful days of the Indian Mutiny a body of British troops and faithful Sikhs were gathered outside a city of the enemy, which had withstood all their efforts to capture it.

As they lay before this city, studying its mighty walls, over which could be seen in the sunlight the white domes of the temples and the crowded roofs of the houses, they noticed a slight movement near the enormous iron gates, which cannon had failed to shatter. The men prepared suddenly and secretly for attack. Then a wagon was seen dashing towards the gates with food for the mutineers. The gates opened, and the gallant soldiers and the faithful Sikhs rose with a shout and raced with all their might for the gates.

The man driving the wagon lashed his horses furiously. The British Army watched those galloping horses, those open gates, and ran like madmen. Their whole hopes depended on reaching the gates before they were tightly closed. Every man knew this, and every man longed to get there first.

Far ahead of the troops ran two white men and a magnificent Sikh. The three were running a race, a great race, each man bursting for the honour of preventing the gates from being closed.

The waggon reached the city, and clattered in at a gallop. The gates at the same time began to close.

On raced the gallant three, and behind them came the roar of the army: "Quick—quick! The gates are closing!"

The Sikh flew past his two rivals, shot forward like an eagle, and, just as the gates were rolling together, flung himself upon them with the irresistible fury of a tiger. Then, as if he were striking at an enemy with his fist, he shot out one of his arms and thrust it between the closing gates.

The flesh and bone were crushed in an instant, but while the broken arm remained there the gates could not close.

He bore his pain without a cry, and when the mutineers on the other side of the gates began to hack and hew at his arm, he waited till it was in peril of being lopped quite off, and then, with a smile of victory, thrust his other arm into the space.

Just before the second arm was hacked off, the army came roaring upon the scene. The men flung themselves with a yell upon the gates, and at the first thud of that tremendous pressure the huge iron doors shivered and gave.

"Push, boys, push!" The gates yielded an inch. "Push, boys—put your backs into it!"

In the midst of the sweating, pushing, and shouting British was a Sikh with no arms, smiling quietly. "One more shove does it!" With a shout of joy the troops burst open the gates and streamed into the city, conquerors at last.

A young British officer found time to stop and smile proudly on the Sikh with no arms. "You ran a good race," he said. It was Frederick Roberts, now Earl Roberts, V.C.

HOW MARY JONES GOT THE BIBLE

NOWADAYS, when a New Testament can be bought for a dime, and a complete Bible for a few cents we can hardly imagine the time when it was almost impossible to get a copy of either. And yet that was the case not very long ago, even in our own country. There were only a few Bibles in existence, and these were too large and cost too much for ordinary people to buy. They belonged either to kings and princes, who perhaps did not read them very much, or to churches, from which, of course, they could not be taken away. Some of you may have seen the big Bible chained by a long iron chain to the reading-desk in

some of our old churches; there are some of them still left.

A little more than a hundred years ago it was very difficult to get a Bible to take home and read for yourself. And if this was the case in England, it was far worse in Wales, where the people were poorer and lived so far apart. As most of the people spoke Welsh and could not speak English, and as there was no Bible translated into Welsh at that time, it would not have been of much use if they had succeeded in getting a copy—they could not have read it. But the Welsh people were longing to have Bibles of their own that they could

read for themselves and study in their own homes.

Among those who were most anxious for a Bible was a young girl named Mary Jones. She lived right up in the hills, a long way from any town, and was very, very poor. But she made up her mind that she would save every penny that she earned, in the hope that some day she might buy a Bible for her very own. Slowly penny after penny was put away in the old

desolate country—a journey that has ever since been famous in the history of Wales. Overcoming all difficulties she reached the little town of Bala, which lies so snugly on the shores of the Bala Lake. There she secured the great treasure upon which she had set her heart, even though she had to part with every penny she possessed, for the Bible cost a great deal then.

And when, after a long and toilsome journey back, she reached her home



This picture shows Lake Bala. Many years ago, when it was very hard to get a Bible, little Mary Jones, living in a village in the hills of Wales, far from any town, saved up her pennies to buy a Bible of her own. She set out on a long and lonely journey over the hills seen in this picture, across rough and dreary country, and bought her Bible from a minister in the little town of Bala, which lies snugly on this lake.

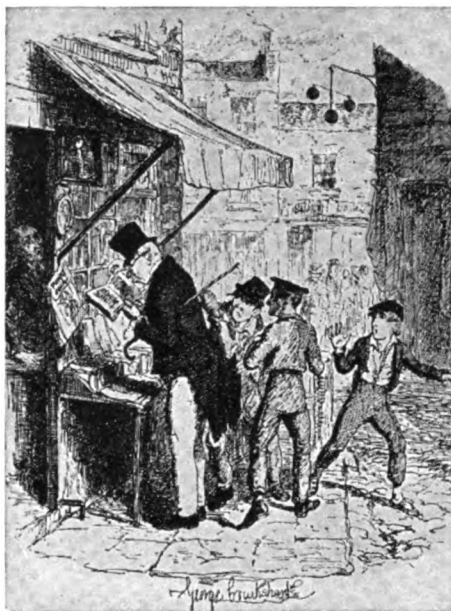
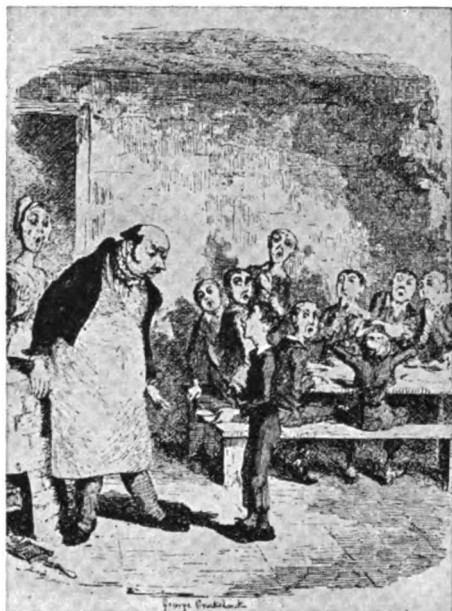
stocking, but it seemed such a very long time. And then one day, when the stocking was growing heavy, she heard that through the efforts of a great and good man, Thomas Charles, a minister at Bala, there would soon be copies of the Bible in Welsh ready to be sold. Thereupon, this plucky girl made up her mind to walk all the way to Bala by herself, in order to be one of the first to purchase a Bible.

So she set out on that lonely journey, over mountains and across rough and

again, we can imagine the joy and eagerness with which she read the Book, for we value a thing according to the trouble it has cost to get it.

If you go to Bala, you will see a statue put up to Thomas Charles, and as you look at it you will feel that one of the things that pleased him most in all his busy life must have been the sight of the little girl from the country-side coming in with her savings to buy the Book that is above all books.

SCENES FROM THE STORY OF OLIVER TWIST



Oliver Twist was an orphan, who was brought up by the parish until he was ten. They were so badly fed in the workhouse, getting little more than a small basin of thin gruel for each meal, that the boys drew lots for one of them to ask for more. It fell to Oliver to make this request. His boldness resulted in his being sent out of the workhouse as an apprentice to a coffin-maker, from whom he ran away, and fell in with a gang of young thieves in London. One of them, the "Artful Dodger," robbed an old gentleman at a bookstall, but Oliver was captured. The bookseller proved Oliver was not the thief, and the gentleman took him to live with him.



But Oliver was recaptured by Fagin, the leader of the thieves, and was handed over to Bill Sikes, to assist that villain in the burglary of Mrs. Maylie's house. Oliver made up his mind that when he was put through the window he would alarm the household, but before he had a chance of doing so he was shot in the arm by the butler. Here again he fell in with friends, as Mrs. Maylie adopted him, and educated him like a young gentleman. In the last picture we see Fagin and a man named Monks, who have an evil plot against Oliver, watching him while he has fallen asleep at his books on a summer day. But, happily for all, these scoundrels are punished at last.

These pictures are from the famous original engravings by George Cruikshank in the first edition of "Oliver Twist."

THE STORIES OF CHARLES DICKENS

MOST of the great novels of Charles Dickens were written "with a purpose." While they were first of all intended to amuse the reader, they were also meant to draw attention to some unhappy state of things which the author, out of his warm love of humanity, sought to have abolished. Thus in "Oliver Twist" he exposes the shameful state of the public workhouses at the time of which he wrote, the early years of last century, and the result of the book was so to awaken interest in the life of the pauper poor that before long there were no Mr. Bumbles to tyrannise over the workhouse children. In the story called "Dombey and Son," whose full title is "Dealings with the Firm of Dombey and Son, Wholesale, Retail and for Exportation," we see how love of money-making and mere pride in business success are poor substitutes for the happiness that comes from love and affection for our own relatives and others.

THE BOY WHO ASKED FOR MORE BEING THE STORY OF OLIVER TWIST

IN the workhouse of a certain English town a baby boy was born. He was christened Oliver Twist, because the beadle, or workhouse officer, whose name was Bumble, gave names to the children born in the workhouse by going through the alphabet from A to Z in the order of their births. He had got to T when Oliver was born. As the mother of the new parish baby died soon after his birth, Oliver was in every sense a poor foundling without friends or relations, so far as anyone knew. This was truly a very unpromising beginning for the boy, but we shall see how fortune favoured him after many extraordinary adventures.

In those days the workhouses of England were shamefully conducted. The one thought of all who were responsible for their management was how to run them cheaply, and as a consequence many of the poor young inmates were done to death by slow starvation and brutal treatment. When Oliver had grown into boyhood, he was sent to live with a Mrs. Mann, who kept a branch workhouse, where a number of other parish children were under her care, all being treated worse than dogs. After a time, however, he was taken back to the chief workhouse to undergo his "education" along with other boys of his age. But though he had been starved to a skeleton at Mrs. Mann's, matters were, if anything, worse at the



workhouse now, for the board had decided to carry out further economies in the feeding of the inmates, and the result of this was to be of the greatest importance to poor little Oliver.

"The room in which the boys were fed was a large stone hall, with a copper at one end, out of which the master, dressed in an apron for the purpose, and assisted by one or two women, ladled the gruel at meal-times. Of this festive composition each boy had one porringer, and no more—except on occasions of great public rejoicing, when he had two ounces and a quarter of bread besides. The bowls never wanted washing. The boys polished them with their spoons till they shone again; and when they had performed this operation (which never took very long, the spoons being nearly as large as the bowls), they would sit staring at the copper, with such eager eyes, as if they could have devoured the very bricks of which it was composed, employing themselves, meanwhile, in sucking their fingers most assiduously, with a view of catching up any stray splashes of gruel that might have been cast thereon. Boys have generally excellent appetites. Oliver Twist and his companions suffered the tortures of slow starvation for three months; at last they got so voracious and wild with hunger that one boy, who was tall for his age, and hadn't been used to that sort of thing

(for his father had kept a small cook-shop), hinted darkly to his companions, that unless he had another basin of gruel each day, he was afraid he might some night happen to eat the boy who slept next him, who happened to be a weakly youth of tender age. He had a wild, hungry eye; and they implicitly believed him. A council was held; lots were cast who should walk up to the master after supper that evening, and ask for more; and it fell to Oliver.

OLIVER ASTONISHES THE WORKHOUSE MASTER BY ASKING FOR "MORE!"

"The evening arrived; the boys took their places. The master, in his cook's uniform, stationed himself at the copper; his pauper assistants ranged themselves behind him; the gruel was served out; and a long grace was said over the short commons. The gruel disappeared; the boys whispered to each other, and winked at Oliver; while his next neighbours nudged him. Child as he was, he was desperate with hunger, and reckless with misery. He rose from the table; and advancing to the master, basin and spoon in hand, said, somewhat alarmed at his own temerity:

"Please, sir, I want some more."

"The master was a fat, healthy man; but he turned very pale. He gazed in stupefied astonishment on the small rebel for some seconds, and then clung for support to the copper. The assistants were paralysed with wonder; the boys with fear.

"What!" said the master at length, in a faint voice.

"Please, sir," replied Oliver, "I want some more."

"The master aimed a blow at Oliver's head with the ladle; pinioned him in his arms; and shrieked for the beadle."

OLIVER IS APPRENTICED TO A COFFIN-MAKER AND RUNS AWAY

The end of the matter, so far as the workhouse authorities were concerned, was to offer five pounds to anybody who would take this bold boy off their hands and make him an apprentice. So, as speedily as possible, he was put out to an undertaker named Sowerberry, where he was fed on the scraps left over from the family table, and had to sleep under the counter. An older boy, named Noah Claypole, who was employed there, bullied the pale-faced little fellow so much that Oliver turned upon

him one day in the kitchen, and thrashed him, despite the efforts of Charlotte, the servant, to keep him away from Noah, who was her favourite. Of course Mrs. Sowerberry took the word of Charlotte and Noah that Oliver was a little wretch who required punishment, and Noah ran away to bring the fat and lazy Mr. Bumble, who was not at all surprised, he assured them, to hear of any outrage by that terrible boy, Oliver. Rather against the will of the undertaker, who had found the boy useful, on account of his pale, sad face, at funerals, Oliver was shut up in the dark cellar for the night. Early next morning he escaped from the undertaker's, and set out to walk to London.

It was a long and toilsome journey which the unhappy boy had undertaken, and after six days' tramping and begging food, almost dead with fatigue and hunger, he had got to Barnet. Here he fell in with a young rascal who had much to do with his later fortunes.

OLIVER FALLS IN WITH THE ARTFUL DODGER ON HIS WAY TO LONDON

He was a jolly, free-and-easy vagabond, this new acquaintance, who promised to put Oliver in the way of a living when they got to London. John Dawkins by name, he was more famous as the "Artful Dodger," and when he got to the outskirts of the town, in company with the country boy, Master Dawkins lingered about till dark, as he thought he was too well known in London to be seen entering it in full daylight. Through the lowest streets of the town the Dodger piloted innocent and weary Oliver, and landed him at last in an evil-looking street, where he gained admission to a still more evil-looking house. This was none other than the notorious den of Fagin, the Jew.

Here the astonished boy discovered the master of the house cooking sausages at the kitchen fire, while a number of other youths, resembling the Dodger, were smoking and drinking at the table. Fagin, with his long, rough beard and tousled hair, of reddish colour, his great hook nose and dirty, swarthy face, his bent shoulders and thin, bony figure, clad in threadbare clothes, was the very picture of evil. Oliver could not at first realise that he was in a den of thieves, and that he was supposed to be a

new pupil for Fagin. But so it was, and he soon discovered that the Jew spent much of his time in teaching his young rascals how to pick pockets.

One day Oliver was out with the Dodger and Charley Bates, another of the young thieves. Oliver had no idea of what they were bent on, and he didn't understand half of the slang words they used. But they tried to rob an old gentleman who was examining books at a bookshop window; and, amazed at this, Oliver ran away from them, only to be caught and accused of the theft. Fortunately, the bookseller saw the whole thing; and the old gentleman, whose name was Mr. Brownlow, was so convinced that Oliver was an honest, truthful boy that he took him to his own home and decided to keep him as his adopted son. His housekeeper, Mrs. Bedwin, soon grew to love the lonely little boy, and he was treated so kindly that it seemed as if his troubles were over; but, alas! that was not so. One day, when he was sent out with some books and a five-pound note to take to the bookseller, poor Oliver was captured by Nancy, a pupil of Fagin, and Bill Sikes, a great brutal burglar, whom Fagin employed.

HOW OLIVER WAS KIDNAPPED FROM HIS KIND FRIEND MR. BROWNLOW

They carried him off a prisoner to the Jew's den once more. He was in despair at what his kind friends, Mr. Brownlow and Mrs. Bedwin, would think of him; but Fagin would not let him go. The Jew had some plan for him, and a prisoner he remained, until one night he was taken away by Bill Sikes, and next morning set out with that scoundrel on a long journey into the country.

At Chertsey, on the Thames, there was a house which Sikes and Toby Crackit, another burglar, were to rob; and Oliver was to be used, because he was little, for putting through a small kitchen window, so that he might go through to the hall and let the burglars in. When he understood what they meant him to do, he determined to alarm the people in the house and tell them all; but he did not get the chance to do this, as Giles, the butler, and Brittles, a serving lad, had heard the noise of the window being forced, and, coming downstairs in time, fired at Oliver, wounding him severely in the

arm. Bill Sikes had just time to pull the lad back through the window and make off with him. Eluding pursuit, the burglars left Oliver for dead in a field and made off. Next day, when he recovered, poor Oliver dragged himself to the house Sikes had meant to rob, and was recognised as the boy who had been shot by the butler.

ANOTHER TERRIBLE ADVENTURE THAT HAD A HAPPY ENDING

Mrs. Maylie, the owner, and her adopted niece were moved to pity for the poor boy, whose innocence was plain to them; and Mr. Losborne, their great friend, managed to put the police off his track in a very clever way, being convinced that the boy was no willing party to the attempt on the house. When Oliver had recovered his strength somewhat, he told his whole story; and Mr. Losborne, who was a generous, impulsive gentleman, determined to punish Fagin and the others, and to find out Mr. Brownlow. Unhappily, Mr. Brownlow's house was empty, and to be let, when he took Oliver there to see him.

But his new friends never lost faith in Oliver, and when one day the boy, sitting at his lessons in one of Mrs. Maylie's rooms, saw the evil face of Fagin and another man staring in at him through the open window, it was clear some other mischief was plotted against the boy. Now, poor Nancy, the companion of Bill Sikes, had always had a tender place in her heart for Oliver, and it happened that she had overheard such words as would put Fagin and this other man, who went by the name of Monks, at the mercy of Oliver's friends. So when the Maylies, with Oliver, were staying in London, poor Nancy went and told Rose Maylie all she knew.

THE FATE THAT OVERTOOK ALL THE ENEMIES OF OLIVER TWIST

Thanks to the efforts of Mr. Losborne and Mr. Brownlow, who had now returned from a stay abroad and had met Oliver again, to the delight of both, the deep-laid plot against the orphan boy was, bit by bit, unfolded. The man named Monks was really the half-brother of Oliver, and his father's fortune had been left to be divided equally between him, his sister, and Oliver, on condition that Oliver never did anything to make his name dishonourable. Monks had employed

Fagin, who in turn employed Nancy and Bill Sikes, to make Oliver a thief; but, as we have seen, all their schemes failed. Mr. Bumble, who had married the matron of the workhouse, who knew part of the secret of Oliver's birth and told it to Monks, was, with his wife, made to confess what they knew. Monks admitted all, on being allowed to go free with half of what remained of the fortune, which he speedily squandered. But poor Nancy was killed by Sikes for having betrayed Fagin, and Sikes himself met his death in trying to escape from the roof of a house where he had been pursued.

Noah Claypole had in turn become one of Fagin's pupils and informed on him, so that Fagin was tried and executed at Newgate for his crimes. The Artful Dodger had before this been caught and "transported," as

these were the days when many of our criminals were shipped away to Botany Bay, Australia.

Not only was Oliver proved to have been an innocent and honourable boy through all his terrible temptations, and so worthy of what remained of his father's fortune, but in Rose Maylie, whom he loved dearly for all her goodness to him, he found a sister, as it turned out she was the sister of Monks. Rose married Mrs. Maylie's son Harry, who became a country parson; and Mrs. Maylie and Oliver went to live in the same village. Old Mr. Brownlow and his housekeeper also took up their home there; nor could Mr. Losborne bear to be separated from those good friends, so he moved there also. And Mr. Brownlow's friend, Mr. Grimwig, who once doubted Oliver's honesty, was a frequent visitor to the village.

THE FATE OF DOMBEY AND SON

MR. PAUL DOMBEY was a cold, hard, stern man; not at all the kind of man who loves children, and yet he wished to have a son of his own. The reason for this was that he was very rich and his whole interest lay in his business in the city; so that if he were to die without a son the firm would no longer be Dombey and Son, a name of which he was very proud. He had a sweet and gentle daughter of six years old, but he cared nothing at all for her, because a girl would not be able to keep up his great business. Now, Mr. Dombey had been married for ten years when two things happened to him which were of great importance to his life—a little Paul Dombey was born, and Mrs. Dombey died. Thus the event he had so longed and hoped for with joy was clouded with sorrow by the death of his wife.

THE LOVE OF FLORENCE DOMBEY FOR HER LITTLE BROTHER PAUL

Little Paul Dombey was an ailing child and from infancy he was delicate, needing the most loving care to keep his little life from flickering out altogether. It was a sad thing for him that his mother had died; but there were two people who loved him in very different ways—his money-loving father and his tender sister Florence. Indeed, this sister

bestowed upon him all the love she had, for she was very lonely and her heart cried out to be loved. In return Paul thought there was no one like Florence, and could not bear to be separated from her for a day. Thus it was that when he was five, and the doctors had said that he should live by the sea in order to have as much of the invigorating air as possible, Florence went with him to Brighton.

PAUL DOMBEY'S SCHOOLDAYS WITH DR. BLIMBER AT BRIGHTON

Paul was sent to a school which was kept by a Dr. Blimber, and he had a very dull life for a boy of his age. There were ten other boys at this school, and Dr. Blimber was a most learned man, who made them all study so hard that they could think of nothing but their difficult tasks all day long, and had not enough spirit left in them to indulge in pillow-fights or other amusements of boys in boarding-schools. But Florence did all she could to help little Paul with his lessons, and the brother and sister were both happy at Brighton in their love for each other, when one day two visitors came to see Mr. Dombey, who was also staying at Brighton at that time. These two people were Captain Cuttle—an old sea-roving man with a hook instead of a hand attached to his right wrist—

and a good-looking young man who had lately come into the office of Dombey and Son. His name was Walter Gay, and he had met Florence before in a strange way. Once when Paul was a few months old his nurse became anxious to see her own children, but she lived in a poor district and was afraid to take Paul and Florence with her down the dirty, narrow streets.

HOW FLORENCE DOMBEY FIRST MET WALTER GAY

But at last her desire to see her own children grew so great that she went with Paul and Florence to her own house in Stagg's Gardens. As she was coming back again to Mr. Dombey's there was a panic in the streets; people were crying out, "Mad bull! Mad bull!" and running away. Florence was terrified, and in her alarm she lost sight of her nurse. In another minute Florence was "lost," not knowing where to turn, and a horrible old woman led her away down some narrow streets and took her to a miserable house, where she removed Florence's pretty dress, her shoes, and all her dainty clothes, and, giving her some rags in their place, let her go away. It was then that Walter Gay had found her, and, taking her to his uncle's, Solomon Gills', shop, brought her afterwards to her own home. From that day the two young people—for Walter was not much older than Florence—loved one another dearly and never forgot their adventure.

But on this occasion no one was lost; they had come, Captain Cuttle and Walter, to ask Mr. Dombey, who did not care for Walter, to lend them some money to rid them of a debt which poor old Solomon Gills was called upon to pay for a fault of Walter's father.

HOW LITTLE PAUL MADE CAPTAIN CUTTLE AND WALTER GAY HAPPY

Mr. Dombey asked Paul what he would do if he had the money, and Paul at once said he would give it to them. He knew, although he was so young, that money cannot provide the things that are dearest to us, and what he wanted most were his mother and his health; so that when he could make Walter happy with the money, he thought he was making the best use of it to allow him to take it as a present. Walter was also taken into the employment of Dombey and Son. Some time

after this, however, Mr. Dombey's manager, whose name was James Carker, was talking with Mr. Dombey about sending a youth to their foreign office in the Barbados, and Walter was chosen to go, for neither of them liked him, and they wished him out of the London office.

The happy days of Paul and Florence were not to last for long. When Paul had been in Brighton for some time he seemed to grow weaker instead of stronger. Florence and he clung to one another all the more as Paul's life seemed flickering out, yet not all the care in the world could save him, and he died with his arms around his dear sister's neck. Mr. Dombey's grief was very great, but it came from pride rather than real love of his son, as the cause of his sorrow was the thought that Dombey and Son would not be the name of his firm in the future.

Before very long Mr. Dombey met a beautiful but cold, proud, and stately young widow, named Edith Granger. She had been brought up by a hard-hearted mother, who cared for nothing but money and pleasure; so that when this wealthy gentleman wished to make her his wife, she thought she would be better with him than living in poverty.

MR. DOMBEY'S SECOND MARRIAGE AND WHAT CAME OF IT

Of course, as neither of them really loved the other, their marriage could scarcely be a happy one. Mr. Dombey thought that his bride's dignified figure and stately grace would look well at the head of his table, while she herself thought that his money would buy her fine clothes and jewels. Yet sleeping in her heart was the wish to be loved and to possess the loving nature which might have been hers but for her upbringing, and she soon grew very fond of lonely Florence, trying her best to fill her mother's place and console her for the loss of her beloved brother Paul.

Mr. Carker, whom we met before when Walter's future was decided, was a very wicked man. He was trusted thoroughly by Mr. Dombey, whom he pretended to respect greatly, yet all the while he was plotting and planning to bring about his downfall. He thought that the easiest way to harm him was to raise up strife between the husband and wife. Overhearing the newly-married couple quarrelling because

Mrs. Dombey had been indifferent and haughty to her husband's wealthy friends, Carker, in his sly way, induced Mr. Dombey to try to break his wife's pride. He was made the messenger of Mr. Dombey to tell Edith that she was not to show so much affection for Florence—now about seventeen or eighteen, and a very pretty girl—as it made too great a contrast between her feelings for her husband and her stepchild.

MRS. DOMBEY LEAVES HER HUSBAND AND POOR FLORENCE IS DRIVEN FROM HOME

At length Edith could no longer endure the insults put upon her pride even before the deceitful Mr. Carker and Florence, and one night she took off and threw down the diamond bracelets from her arms, the jewels from her hair, and, treading on them, told her husband she could no longer live with him. She did not even say good-bye to her stepdaughter, and before anyone knew exactly what had happened she was gone.

Florence, though so often repulsed by him, still loved her father, and wished to comfort him in his sorrow. She ran to him, crying out, "Oh, dear, dear papa!" and held out her arms to him; but he struck her cruelly and told her to follow her stepmother. There was now for the poor girl neither father, mother, brother, nor home, and in her trouble she could think of but one place to which she might go; this was to the shop which had been kept by the uncle of her dear friend Walter Gay.

While sorrow had come to this great house of Dombey, it had not left alone the humble home of Walter Gay. The ship on which he had sailed was a wreck, and the old uncle had left his shop to seek for his nephew, if he were alive, so that when Florence reached the shop she was met by Captain Cuttle.

FLORENCE DOMBEY FINDS A GOOD FRIEND IN OLD CAPTAIN CUTTLE

Greatly delighted he was to see her, carefully he prepared the bed in Walter's old room for her, and he accompanied her whenever she went out shopping. His one disappointment was that she would take no money from him for her little needs, as she had some money of her own. Then Captain Cuttle one night told her a wonderful story of a brave boy who had sailed abroad, been wrecked, but by a miraculous chance had been saved after much tossing on

the angry sea. Before he could say much more a bright-faced young man was beside her. It was Walter Gay, whom she had loved as though he had been a brother. You may imagine what a happy meeting this was, and how many happy days were to follow in which the young people grew to love each other more and more dearly, until at last it was decided he should become even more to her than a brother, and before long they were married.

In the meantime Mrs. Dombey had fled to France, and there she met Mr. Carker. Mr. Dombey followed them, and Edith had scarcely had time to tell Mr. Carker of her great hatred for him when he found that his former master had tracked him out. By coach he made his way for days towards the coast of France, his pursuer following him closely. At length Mr. Dombey made up on him, but while he was stepping aside to elude his pursuer, Mr. Carker fell on the railway track, the great engine was upon him, and crushed him to death. So perished this wicked man, though even yet his influence for evil was to continue. When Mr. Dombey reached his home he discovered that he was ruined, that Mr. Carker, in whom he had so greatly trusted, had been for years robbing him of his money.

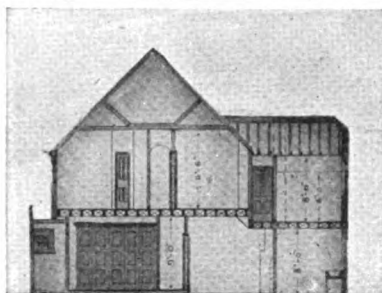
FLORENCE FORGIVES HER FATHER AND MAKES HIM HAPPY IN HIS OLD AGE

Now, though it may seem that Mr. Dombey deserved all his troubles for his cruelty, Florence's heart went out to the father who had never been kind to her. As he was sitting alone the night before he was to leave his fine house, thinking about his past, there came to him in his loneliness one whom he had never pitied in her loneliness, and the loving arms of his little Florence were clinging to him. She begged him to forgive her for having left him, and told him of her marriage. Then she made him even more happy by telling him that she had a little son, whom she had called Paul, and that he was like the child of whom they had once been so fond. So, though the firm of Dombey and Son, which had once been his pride, almost his worship, was now no longer in existence, the old man at last found true happiness in the love of his daughter and her little children, Paul and Florence. The next stories of Famous Books are on 2633.

THE BUILDING OF A HOUSE



The first thing that must be done in the building of a house is the plan of it. First of all the architect must draw a picture of the house, with plans of every part, showing the house as it is to look when the builders have finished.



Not only must the architect draw a finished house, but he must make plans like this, showing how the house would look if it were cut in two with a knife. This is called a section.



The builder hands the plans to the foreman in charge of the works, who engages men to prepare the ground. In this picture we see the workmen digging trenches in which the bottoms of the walls are to be built. In these trenches the foundations of the walls can be made strong and sure; if there were no trenches like these for the bottom of the walls the house might be blown over in a storm. The plan of the house is here seen in the ground.

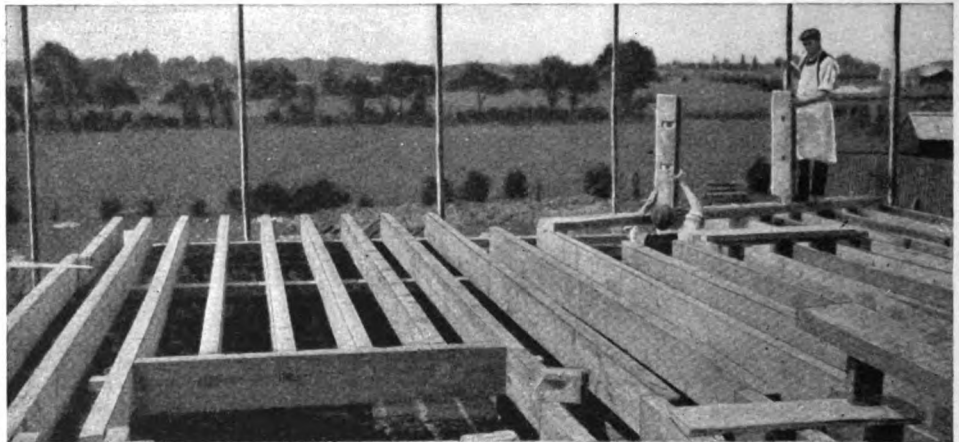


These men are mixing sand, lime, and water to make mortar—the cement which holds together the stones or bricks of the house. Mortar sticks so fast that walls which it has held together for thousands of years still stand.

THE WALLS OF THE HOUSE BEGIN TO RISE



When the trenches have been prepared and the mortar is ready, the men begin to lay the foundations of the walls in the trenches. This is the real beginning of the house. The bricks are seen piled up in huge stacks close by.

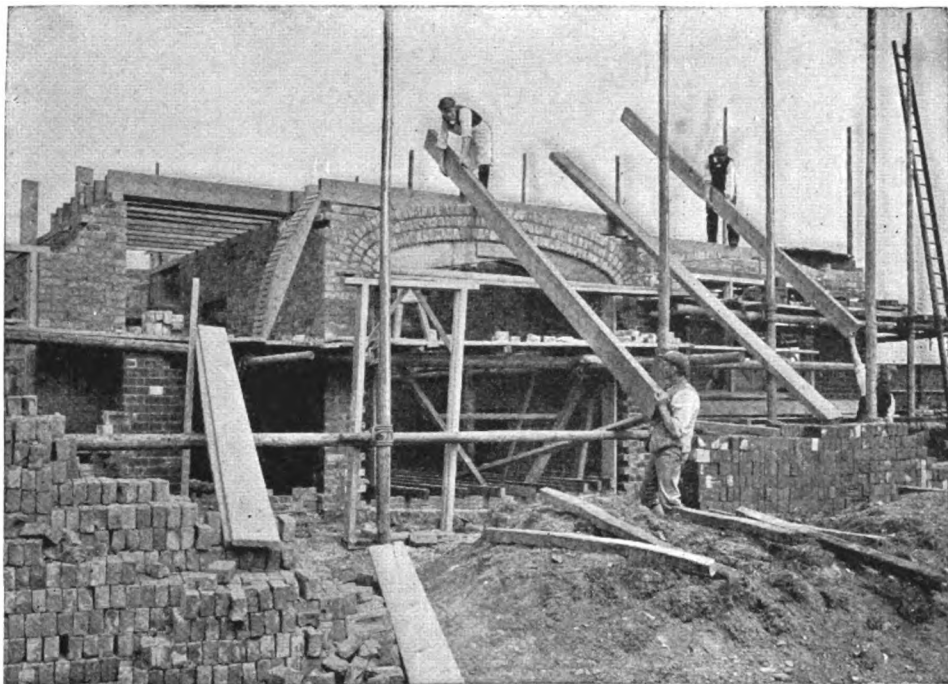


When the walls have been built a few feet high, the carpenters are ready with the strong wooden beams to which the great planks for the floor are to be nailed. Notice that the beams are not laid flat, but on their edges. They are much stronger this way, and it would never do to lay them any other way; if they were laid flat the floor would bend.

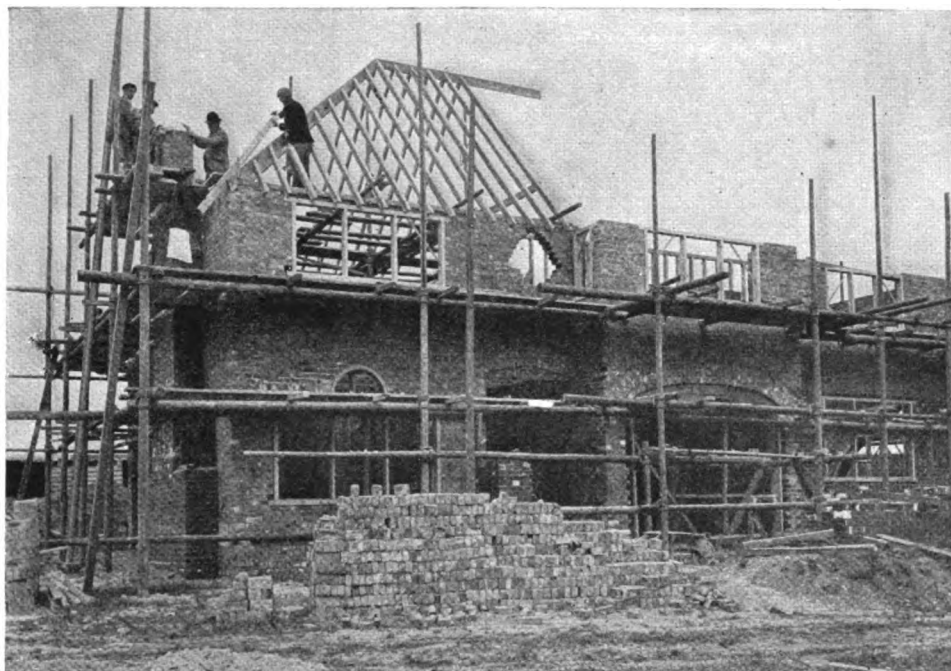


The walls are beginning to rise, and the carpenters are here fixing the wooden frames for the doors and the windows. As soon as the brickwork reaches a place where a door or window is marked on the plans, the bricklayer must let the carpenter know, and the carpenter must be ready to fix his door and window-frames.

THE HOUSE HAS REACHED THE FIRST FLOOR

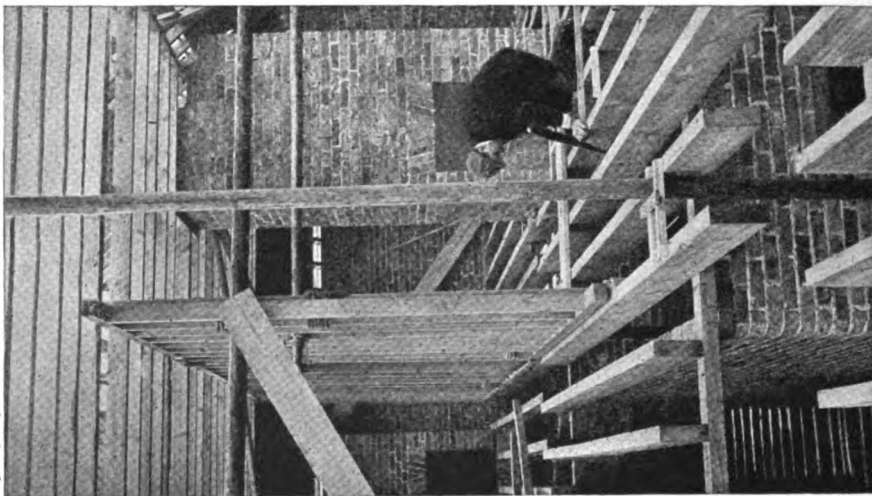


The first storey of the house is nearly finished, and the workmen are fixing the wooden beams which make the ceilings of the rooms downstairs and the floors of the rooms above. As the walls rise, the builders must, of course have a higher place to stand on, and we see the scaffolding erected on the scaffold-poles around.

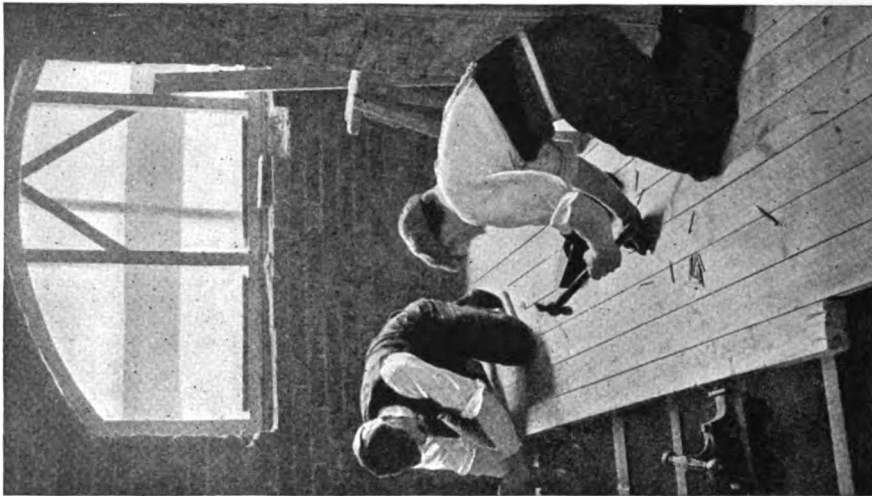


The carpenter has now reached the roof, and the wooden beams which are to be covered with tiles are being put into their places. The beams are put in a sloping position, so that the rain will run off the roof easily.

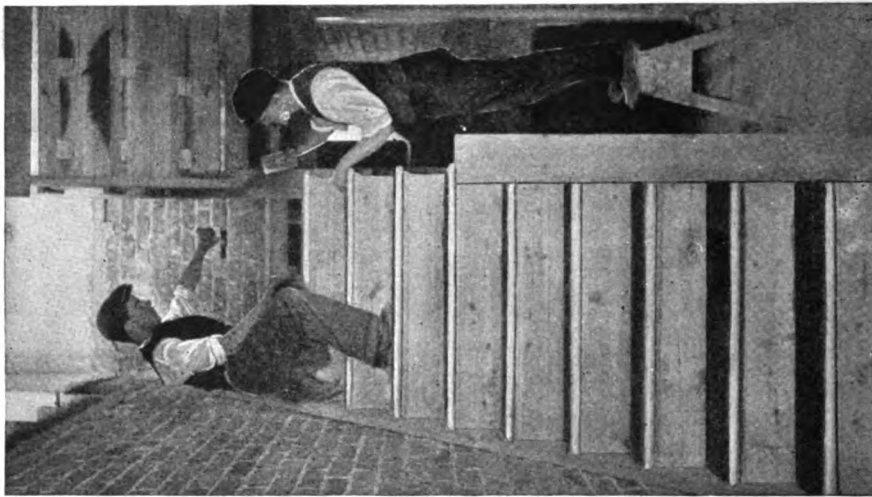
WHAT THE HOUSE LOOKS LIKE INSIDE WHEN IT IS BEING BUILT



This picture gives us an idea of how a house looks inside while it is being built. It is not yet very much like home. The carpenter is at work on the walls between the rooms.



Here the carpenters are laying the floor. The planks are sawn to the proper length and nailed to the beams. They must be fitted tightly so that nothing can come through.

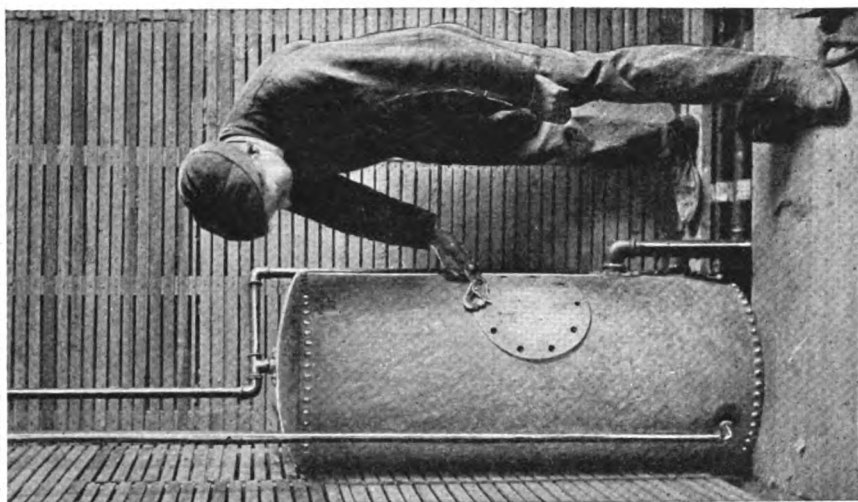


The carpenters are now on their way upstairs—they are always the first to go up the stairs of a new house. Every step is made of two pieces of wood, fastened to bear great weight.

BUILDING THE INSIDE WALLS THAT DIVIDE THE ROOMS OF THE HOUSE



The workman is here finishing the walls between the rooms. These need not be so strong and thick as the outer walls, and are made of upright beams with thin pieces of wood called laths nailed across. These are covered with plaster.

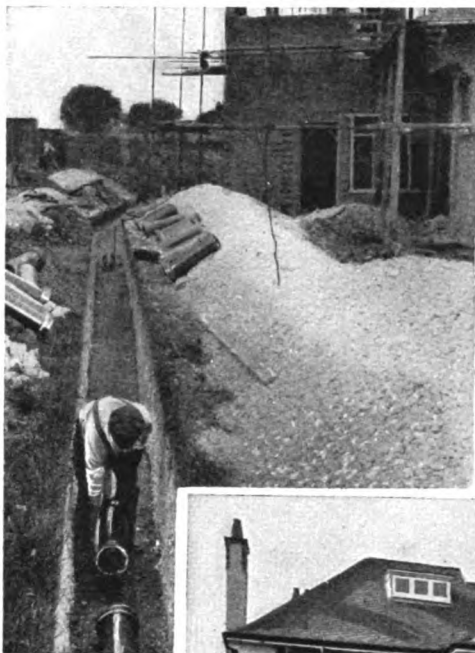


Before the walls are finished the gas and water pipes must be put in their places, and here we see the plumber fixing a cistern for hot water. The pipes go to the kitchen, where the fire heats the water on its way into the cistern.



The plasterer is here covering the laths and completing the inside walls. The walls generally have three coats of plaster, the first and second coats being coarse, and the third smooth, such as we see on the white ceiling of a house.

THE COMPLETION OF THE HOUSE



While the house is rising the plumbers are busy digging trenches outside and laying pipes for gas and water and drains, the trenches being afterwards filled with earth



The slater is laying slates. He must begin at the bottom; if he began at the top he could only lay the tiles so that rain would go under them into the house instead of over them.



Almost the last work in a house is the window-fixing and the painting. You have often seen windows in a new house daubed with white paint. This is to keep the builders from jumping through. Workmen often jump through windows before the glass is fixed, and the white paint warns them that the glass is in. The painting of a house is very important, not only because it makes the house look fine, but because paint protects the woodwork from wind and rain.

The next Familiar Things begin on page 2727



PLANTS ANYWHERE AT ANY TIME

WHEN the days are fine and bright, there will always be plenty to do in the piece of garden which is one's very own. In rainy weather, and during the winter, those of us who love to grow plants seem to be separated for a while from our treasures. There is no reason why this should be so, for, with a little care, we may easily have an indoor garden that we can enjoy all the year round.

Now, most plants, of course, grow in soil ; but there are a certain number which may be kept alive without any earth at all, if they can have plenty of fresh water. These plants are just what are wanted for an indoor garden, as there is no need to use any mould, which is dirty stuff to have in the house.

The best plan for the garden without soil is to get leave to use a table or a shelf near to a window ; and in order to prevent the water from spilling on the floor, it is just as well to have one or two large trays on which to place the plants.

It is very interesting to sow various kinds of seeds in the indoor garden, such as canary-seed, cress, or linseed. For this purpose clay shapes can be purchased at a florist's shop. These are sometimes made in the form of a man's head, or a pig, and are very quaint-looking. The idea is to sow the seeds on the roughened part, and in this way, when the little plants are grown, to give the object the appearance of having long, upright green hair. The shapes are hollow, and must be filled with water.

The best way to sow the seed, which is bought in small packets from the dealer, is to place a little in a teaspoon, and then to shake it over the rough surface. As the water will soak through the clay, the shape must, of course, be filled up afresh every day.

Another way of growing small seeds is to

CONTINUED FROM 2490

borrow a sponge—a good big one if possible—and, after soaking it in water, sprinkle the seeds fairly thickly over the surface. If we want the seeds to grow quickly, we keep the sponge in the dark until the little plants appear. We then put the whole thing in a light place and keep it watered every day, or let it stand on a tumbler of water, and soon the sponge will be covered with bright green plants. If the sponge is not allowed to get dry, the seedlings will last for quite a long while. We may use a piece of thick flannel instead of a sponge, and it will do nearly as well as the other.

Some of the most curious plants for our indoor garden are those which are known as Resurrection Plants. They are called by this name because, when they are in a dry state, they look just as if they are dead, but if they are placed in water they become green and alive. Everybody who has a garden without soil should try to get one or two of these plants, for they can be easily purchased.

When you receive your first Resurrection Plant you will think that the dealer must have sent you a dead plant in mistake, so dry and withered will it look. Do

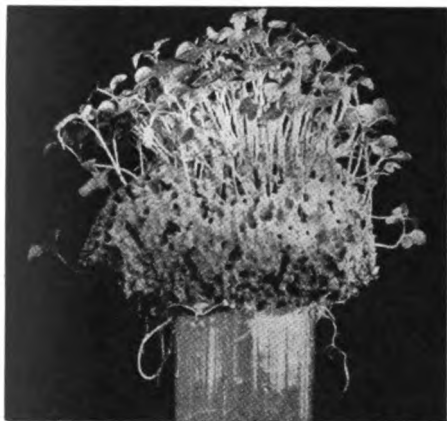
not make up your mind, however, until you have followed the directions which are given here. Get a bowl, large enough in size to take the plant, and fill this with warm water. Now take your plant and put it into the water, pressing it down, so that it will become well soaked. Next put the bowl in a warm place, and leave it for a few hours.

When you come back you will find that the dead-looking Resurrection Plant has expanded into a beautiful green one, which is wonderfully fresh and alive. The plant is now quite ready for taking to the indoor garden, where it may be put in a saucer of water. It will keep green as long as water is



Cress-seeds growing on a clay head

supplied, but it is not wise to allow the plant to grow for too long a period at a time. After a week or so the Resurrection Plant must be dried off, and allowed a month's rest, when it may be soaked into life again.



A bed of cress growing on a wet sponge

Many kinds of plants will root and grow for a long time in plain water alone. One of these is the spiderwort, a variegated plant often seen in cottage windows, which will live and send out a lot of roots in a glass bottle. Sprigs of ivy can be made to do very much the same, and there was a lady who decorated her fireplace in the summer in this way. The shoots of ivy were placed in jars of water, and sent out many roots.

In January, if small branches of some of our flowering trees, such as almond or wild cherry, are gathered and kept in vases of water in a warm place, they will come into full blossom long before their natural time. In all these cases it is necessary to keep the



The Resurrection Plant, that seems to be dead and withered, but comes to life again in warm water.

water in the jars quite fresh, and this will be more easy if a piece of charcoal is put into each.

An interesting curiosity, which will do well for our garden without soil, is the arum from India, called the Monarch of the East. Bulbs

of this strange plant can easily be obtained from the seedsman at a small price. It is quite one of the most remarkable plants in the world, for it will produce its great flower not only without any soil at all, but without water either.

The only thing we need do is to place the bulb, when we get it, in a light position, and simply leave it. If the room is nice and warm, it will not be long before the bulb will send up a long shoot, which quickly grows into a most magnificent flower, sometimes two feet long. This is all coloured in crimson and yellow, and bears a long red spike. The best time to buy the bulb is about January.

If we want the bulb of this arum to live after it has flowered, we must plant it in earth, in a pot or out in the garden. After a while, in place of the great flower, will be sent up a giant leaf, which is really very handsome. At the end of the summer the bulb



Spiderwort growing in water without any soil

may be taken up and allowed to become dry, and then it can be put into its place once again, ready for flowering once more.

There are many other things which we might put in our garden in the house. Most children know that an acorn will grow into a fine little oak-tree if it is placed in a narrow-necked bottle which is kept well filled with water. In the same way, snowdrops and the dainty little blue scillas may be grown, and give us some gay flowers for the indoor garden. When we are out in the woods, we may gather portions of the bright green mosses, and these will live for many weeks if put into saucers containing a little water.

By getting together a collection of these different plants that do not require soil, quite an interesting indoor garden may be made, and this may become really pretty if the plants that form it are daintily arranged.

PUZZLING CARDS: WHICH IS THE LARGER?

AN old proverb says that things are not always what they seem, and this

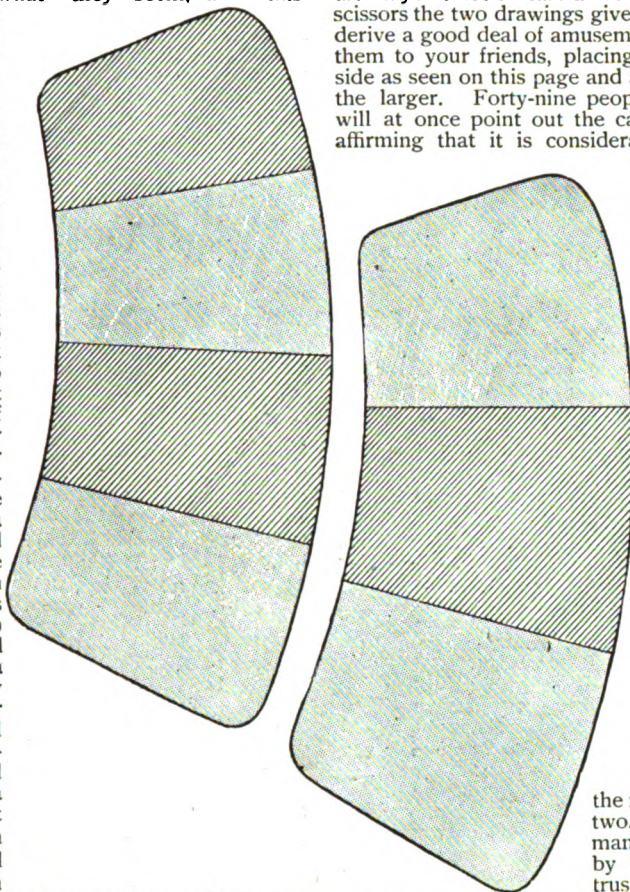
is something everybody finds out for himself sooner or later. Especially in regard to the size of things our eyes are prone to deceive us, and are particularly untrustworthy when we ask them to give us details. Ask any friend to point to a spot on the wall of the room or upon the door that would indicate the height that a silk hat would be if it were placed upon the floor. It is almost certain that your friend will touch a spot very much higher than the real spot. Probably he will indicate a point about twice as high as the hat will actually reach

when it is placed on the floor. There are many other ways by which we can prove how deceptive are our eyes. Here we have an

interesting proof of the tricks that our eyes play us. If you trace on card and then cut out with scissors the two drawings given here, you can derive a good deal of amusement by showing them to your friends, placing them side by side as seen on this page and asking which is the larger. Forty-nine people out of fifty will at once point out the card on the left, affirming that it is considerably the larger

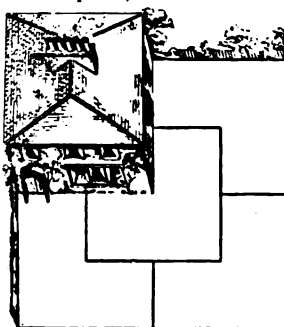
of the two. You may then ask your mistaken friend to say if he can tell by how much it is larger than the smaller one, and he will probably say that it is about one-fourth or one-fifth larger than the other. As a matter of fact both pieces are quite the same size. There are two things that assist each other in deceiving our eyes; one is the shape and position of the two pieces side by side, and the other thing is

the markings on the two. There are many other devices by which the untrustworthiness of our eyes may be proved, and we saw some of them on page 104, but none of them is more striking than the one given here.



HOW THE FATHER DIVIDED HIS GARDEN

ON page 2489 is the problem of the garden which had to be divided into four parts, each equal in size and shape to the others. The birdseye view of the garden here given shows us exactly how it appeared after being so divided. In order to solve the problem we must set to work like this: First, we must make a tracing of the house and garden. Now, we know that the house stands upon one quarter of the whole ground, so if we continue the sides of the house we shall divide the garden into three equal squares. Next we divide each of these squares into four equal squares, and we have the garden divided up into twelve small squares, all equal.



By taking three squares for each child, the father was able to give Harry and Leslie and Doris and Gertrude each a plot of ground of the shape shown in our picture here. We can see at a glance that each piece is equal in size and shape to the others, but if we divide the garden in the way described here, we not only get the correct solution, but are able to see how and why the plots of ground are equal. The boys and girls were very much interested in their father's division of the garden, and they agreed that although at first they had thought it difficult and almost impossible to divide the ground into parts of equal shape as well as size, the solution was really simple.

THE MYSTERIOUS PAPER PURSE

THE young conjurer borrows a dime. Taking a piece of paper about four inches square, he lays this on the table, puts the coin in the centre, and folds down the sides over it. There is "no deception" so far; the coin is honestly wrapped in the paper.

Picking up the little packet, he asks someone to blow upon it, or does so himself. When he again opens the paper the dime has disappeared, and the owner probably begins to wish he had not lent it. But again the young wizard folds the paper. Once more he blows upon it, and once more unfolds it. The dime has come back, and the owner of the coin looks quite cheerful again.

We hear it said of a boy sometimes, that he "is not such a fool as he looks," and the same sort of remark might fairly be made about our simple-looking bit of paper. It is not quite so simple as it appears to be; in fact, it is a "trick" paper, specially arranged for the purpose of this feat. The young conjurer may find some amusement in preparing such a paper for himself. To do so, he should proceed as follows:

Take a half-sheet of ordinary note-paper and fold it in two. Then, with a sharp needle, make four little holes through both thicknesses of the paper, two inches apart, so as to form a square, as shown in our first picture. Then cut apart the two portions of the paper, and fold down the edges of one of them towards the centre, using the needle-marks as guides. The paper thus folded will form a sort of little pocket, or envelope, as in picture 2. Paste or gum this in the centre of the other paper, exactly between the needle-marks. The two together will now look on the one side like our third picture, but on the other side like a plain piece of paper.

This last is the side which, in performing the trick, you show to the company, taking care, by the way, not to show it with a light behind it, which would give away the secret. You then lay the paper, with this side uppermost, on the table. Having placed the coin on the paper, you fold down the edges over it, again using the needle-marks as guides, so as to make the folding correspond exactly with that of the pocket on the other side. The paper will now in reality form two such little pockets, back to back, but if you have done your work neatly, no one will notice that such is the case. In the act of offering the paper to be blown upon, you turn it over so that when you again

open it, it is the empty side that you open. When it is blown upon for the second time, you again turn it over so as to bring the side in which you placed the sixpence uppermost.

You must, of course, not let the company perceive that you reverse the paper. To do

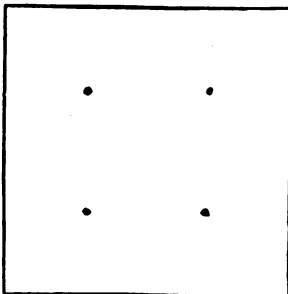
this in proper conjuring style, you should hold it in the first instance clipped between the first and second fingers of the right hand. As you offer it to be blown upon, you must push it upwards with the thumb and clip its outer edge between the thumb and forefinger, when it will have performed an imperceptible somersault. The turn over should be made with the arm in motion, when the greater movement will conceal the less important from the spectators.

The dime is brought back again by a repetition of the process. Of course, you are not bound to use a dime. Any piece of money, or a bone counter, may be substituted, according to the effect you desire to produce. Further, you may use the paper not only to "vanish," but to change one thing into another. For instance, in order to change a dime into a nickel, you have only to place a nickel beforehand in the pocket on the reverse side of the paper.

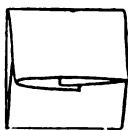
You may use the same paper more than once if you please, but it will in such case show by the creases that it has been previously folded, and the effect is scarcely so good

as with a freshly prepared piece of paper.

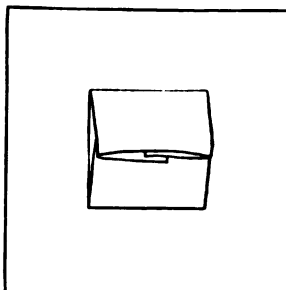
The method above described is the simplest form of the trick. You may improve it considerably by using three pieces of paper instead of one. One of these must be rather smaller, and the other larger, than the trick paper. The smallest one we will call No. 1, the trick paper No. 2, and the largest paper No. 3. The first and last are mere plain pieces of paper, but you must have an exact duplicate of No. 1, and place this beforehand, properly folded, in the pocket of No. 2. When you work the trick in this manner you should, in a careless sort of way, show both sides of No. 1 before wrapping the coin in it. This done, you place this paper, with the coin in it, in No. 2, and then this latter in No. 3, first, however, turning it over as described. The trick is now done. When you come to No. 2, it is the empty duplicate of No. 1 that you find therein. This you should hand to someone else to open. Nos. 1 and 3 being obviously mere ordinary bits of paper, no one will suspect that No. 2 is a fraud.



1. Paper marked for folding



2. The folded paper purse



3. The back of the paper as prepared for use

FITTING AN ELECTRIC BELL

To most boys the working of an electric bell appears to be a mystery, because the connecting wires do not move, as they do with an ordinary pull bell. But it is really very simple, as we shall see in this article. You must first of all have a battery, preferably a Leclanché, like the one described on page 1075, to make the electric current. Now, this current rings the bell by means of magnets which are formed from iron rods, wound round with wire. You can make a simple electro-magnet, as it is called, like that in picture 1. Get a little piece of iron rod—not steel—and coil some cotton-covered bell wire around it, leaving sufficient at each end to attach to the terminals of the battery. Secure one end to a terminal on the battery, and hold the other in your hand; then let this loose end touch the other terminal, and you will find that the iron rod is turned into a magnet, able to attract and pick up other bits of iron and steel. But directly you pull the loose end of wire away and so break the current, the rod loses almost all its magnetic power. If you were to use a hard steel rod, this would retain a good deal of the magnetism imparted to it by the current flowing around the coils of the wire, and become a permanent magnet. This kind of magnet, however, is not suitable for use in making a bell.

Looking now at the bell, as illustrated in picture 2, you see the gong, by which the sound is produced, when struck by the little hammer on the end of the bent wire. The current comes from the battery to the two terminals attached to the baseboard of the bell, and passes down the brass strips connecting the terminals to the wire on the bobbins on one side and to the little pillar or "contact-breaker" on the other. This pillar has a screw, tipped with platinum, which does not get oxidised or dirty, exactly opposite another spot of platinum on the tail of the flat spring which we have already seen carries the armature. The wire from the bobbins, on the left-hand side, goes up to the end of this spring, so that, if the two platinum surfaces meet, a complete circuit takes place. Now a peculiar thing happens, due to the adjustment of the flat spring, which is set so that the platinum bits just meet. The moment the

current is turned on, the two bars inside the bobbins, together with the frame to which they are fastened, become magnetised; and the armature jumps like lightning towards the magnets, making the hammer strike the gong. But the flat spring has now moved away from the platinum-tipped screw on the contact-breaker, so that the contact is broken, the current does not flow, and the bobbins fail to magnetise the bars within them.

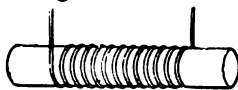
What happens, of course, is that the armature falls away under the persuasion of its flat spring. But still it has no peace, for the platinum surfaces meet again, and the same action occurs. These to-and-fro movements are very rapid, so that you can understand why the bell is called a "trembling" bell. These bells can be bought from twenty-five cents upwards. Some of the smaller ones are made entirely of metal, instead of having a wooden baseboard and cover, and more elaborate ones may be had nickel-plated.

It is necessary to have some means of easily making and breaking the current between the battery and the bell, so that one can make the latter ring when desired. This is done by a "push," which in the case of a house bell is fixed by the side of the front door for visitors. The push seen in picture 3 has a brass or china button in the centre, and the inside is made as shown in picture 4. The wires are

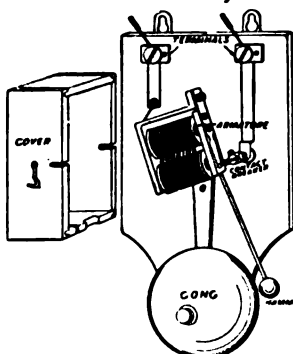
brought, as seen, to two screws, one let into the side of the barrel and the other into the middle of the brass piece in the fibre disc. So long as the press stud is not touched no current can flow, because the fibre acts as an insulator—that is, it is not a conductor of electricity. The moment you press the button, the tail moves along and the two platinum faces meet, and the current passes.

This kind of push is made all in metal, and is constructed so that the rain cannot get in. Some wooden pushes are very cheap, only a few cents each, but they would not do for out of doors, where the weather would quickly warp and split the wood.

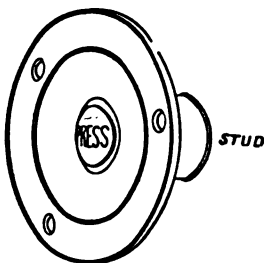
The only other thing required in connection with the outfit is a supply of wire, to connect the battery, bell, and push. Copper wire is used, and it is insulated, being covered with plaited cotton over a thin layer of rubber. The wire is tinned to prevent oxidation, and the cotton covering is soaked in wax to render it proof against damp. We have observed in the pictures of the bell that there are two



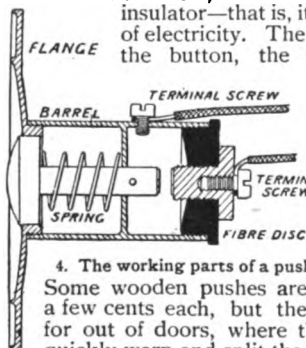
1. An electro-magnet



2. Parts of an electric bell



3. The push



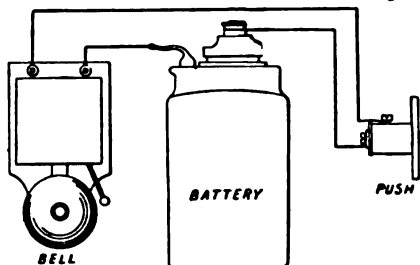
4. The working parts of a push

Some wooden pushes are very cheap, only a few cents each, but they would not do for out of doors, where the weather would quickly warp and split the wood.

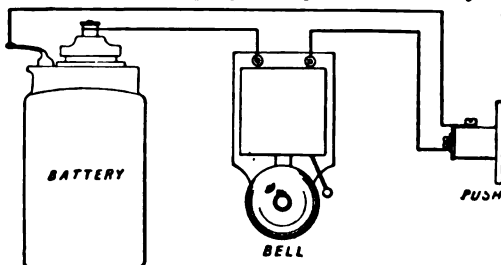
The only other thing required in connection with the outfit is a supply of wire, to connect the battery, bell, and push. Copper wire is used, and it is insulated, being covered with plaited cotton over a thin layer of rubber. The wire is tinned to prevent oxidation, and the cotton covering is soaked in wax to render it proof against damp. We have observed in the pictures of the bell that there are two

terminals each on the battery, the bell and the push, and these must be coupled up with wire in such a manner that a continuous circuit, or course, is formed for the current to pass when the push is pressed. It does not matter which is nearer the push—the bell or the battery. Pictures 5 and 6 show two arrangements, with black lines representing the wires connected with the terminals. When the push is pressed the circuit is completed, and the current from the battery passes

purchased in this way, ready for installation. Having the bell, battery, and push, we must find the length of wire required, the best way being to take a ball of string and measure the distance with it. Start from the door where the push is to go, and run up inside the corner of the wall and along the angles of the ceiling, and round any corners to the place where the bell has to go, and then on to the battery. Allow two or three feet over for connecting up and possible errors you



5. Arrangement of the bell system: the battery between the bell and the push



6. Arrangement of the bell system: the bell between the battery and the push

throughout the system, causing the bell to ring so long as the push-button is held down.

In these drawings the parts are shown close together for convenience, but it must be understood that it makes no difference to the working if they are separated by a considerable distance, because the current goes through the wires readily. The battery, therefore, need not be placed close to the bell. Thus the latter is usually placed in a hall or back room, and the battery in any cupboard or on a shelf that happens to be handy. It must not be placed too high up, because the heat of the upper part of the room will dry up the solution too quickly. In some cases the bell and battery are mounted together on a little bracket. They can be



7. Wire staple

may make in measuring, and either measure the length of the string in yards, or take it to the electrical shop and ask for wire of *double* that length. This is because it has to go the distance and back again. Or we can buy "twin" wiring, which is composed of two copper wires, insulated from each other, and again wound round with cotton covering, forming only a single piece, which is more handy to fit up than the two separate strands. If we buy twin wire, it need be only the length of your string. Tinned staples, as shown in picture 7, are used to fix the wire to the walls and corners. Take care not to drive these staples in too tightly, or they will cut through the insulating material, and make a "short circuit" between the wires.

THE PUZZLE OF THE LAUGHING SAILOR

HERE is the portrait of a laughing sailor made up of lines and dots. Now, what is he laughing at? Well, he knows that there is a puzzle to be solved in connection with his face, and he is laughing because he thinks none of us will be able to solve it. If we look closely at the portrait, we shall see that in several parts the string of lines and dots comes to an end in a single dot, as, for example, in the eyebrow and the ear. There are, altogether, six of these places where the lines come to an end. Now, this is the puzzle of the laughing sailor's face. If we start at the big spot in the middle of the man's cap, counting that as number one, it is possible to move along the lines, counting the dots as we go, till we come to a twenty-fifth dot, and that dot to be the dot



at the end of one of the lines like the eyebrow, where you can go no farther. There are several ways in which this can be done, and we can take them one after another, and, starting at the button in the centre of the cap, reach the dots where the lines end, counting only twenty-five dots in all each time, including the one where we finish and the big dot in the middle of the sailor's cap. Now let us see if we can do this, and in how many different ways it can be done. We do not want to spoil this book, so we will take a piece of tissue or tracing paper, and, putting it over the sailor's face, trace it. Then we can mark the traced copy. Be sure to remember that we count the big button of the cap where we start as the first dot, and we must always end at the twenty-fifth.

A USEFUL SHOE-BAG OF SERGE

WHEN we go out to tea at a friend's house, or to a dancing class, we find a bag of some kind useful for carrying slippers. It looks better than a brown paper parcel, and the shoes are popped into it in a moment.

If we make our own bag, we can shape it as we please, and cut it large or small according to the size of the shoes to go into it. One made in the style of the Dorothy bag with a running cord looks well; it costs little, for it can be made for less than a quarter, and is light and convenient to carry on the arm. If made of rather thick material, the bag will keep out the rain.

The materials required are these: a piece of some fairly thick material measuring about thirty inches by thirteen inches, such as the green art serge, fifty inches wide; the same quantity of sateen for the lining—a suitable kind thirty-one inches wide is sold; one yard of twisted silk crape cord. Silk crape cord is the name for it, though there is no resemblance to crape.

If we choose the green art serge for the material, the sateen lining might be of a golden brown colour, and the cord to match.

We must remember that slippers are going into the bag, therefore a light, dainty colour, such as cream, would be less serviceable for a lining than a darker one.

Having cut out the serge and the sateen, we fold the serge over in halves lengthways, wrong side outermost, join the sides together from the fold to about three-quarters or more up the sides by a stitched seam of rather small stitches, far enough from the edge to prevent fraying, using, if possible, green cotton to match. Then we fold the sateen for the lining in the same way, but, instead of making stitched seams up the sides, we turn in the rough edges of the sateen, and, placing one over the other, sew them over and over with close, neat stitches, taking care not to pucker the sateen, and, if it is at hand, using thread to match. The passing of a hot iron over these seams will make them lie flat.

Now we have roughly made two bags, one of the serge, the other of the sateen. Let us turn the sateen bag inside out and then push the serge bag into it, taking care to fit it into the corners nicely, till the lining lies smoothly against the serge. It will be necessary to stitch the lining to the material at the bottom corners to prevent its being dragged out when the shoes are withdrawn from the bag; but we should not let the stitches show through the material.

The bag now has the lining outside and the material inside. The next thing to be done

is to finish the top of the bag. First we turn in the rough edges of the serge and the sateen from the point where we stopped joining up the sides of the bags, and hem the sateen down on to the serge a little way from the edge of the flaps, so that the lining does not show when the bag is seen held upright.

Now the bag is ready for the running cord. There are two ways of running this into the neck of the bag. We may buy half a dozen bone rings for five cents a dozen and sew them at intervals along a line two or three inches from the edge of the flaps; then pass the cord through these and sew the two ends of it together. Another way is to make two running seams with green thread two or three inches from the edge of the flaps through the serge and the sateen, wide enough apart to leave room for the cord between them. The bag at this stage—lining outermost and ready for the running cord—is shown in picture 1.

If we have no bodkin with an eye large enough for the cord, we can tie a thread to the end of the cord, and use a bodkin to draw this through the neck, dragging the cord after it.

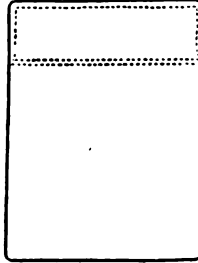
We now turn the bag right side out and it is finished, as shown in picture 2.

We have made, of course, quite a plain shoe-bag in which the shoes can be carried placed toe to heel and upright, so that they do not poke and get in the way when carried in the bag, as they might do placed flat along the bottom of it.

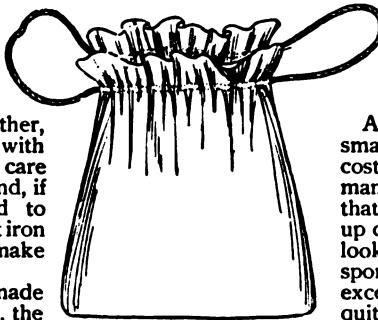
Many girls like to embroider the owner's initials on the bag. This can be done with *lustrine* or crewels in satin stitch as described on page 1508. Or we may form the letters with the cord by stitching it down to the material. In either case the monogram is worked on the serge before it is made into the bag.

A novel material for a very small shoe-bag, and one that costs nothing, is the silk of a man's old silk hat. The fact that the surface has been rubbed up does not matter, for it now looks like fine plush, and after sponging and heating makes up excellently, wears well, and is quite light for a little girl's hands. A scarlet sateen lining or red twill would do well for this little bag, and the effect is charming.

These little Dorothy bags are useful for all kinds of things. If they are made of soft satin, of some dainty shade, they may be used for a work-bag. Many people make them of a much smaller size, fit them up with needles, cottons, scissors, and thimble, and use them instead of a little work-basket. Such a bag is more handy than a basket, as it can be tucked away in a corner of a trunk.



1. The bag ready for the running cord



2. The shoe-bag finished

CAN YOU TELL THE REASON WHY? THE GAME OF "WHY IS IT?"

HERE is a game which may be played in a very similar way to those described on pages 2356 and 2490. A boy or girl should read out the descriptions, and the game is to explain the causes. A large number of the answers should be quite well known to readers of this book. They are, however, given on page 2660.

SHOULD THE RAILWAY LINES JOIN?

1. There is a little path across a meadow near our home. It leads down to a railway cutting, and, sitting on the stile at the end of the path, we can look down on to the railway lines. Yesterday some of us were waiting there to see the express pass, and we noticed that where two rails joined end to end they did not quite meet. There was a space of about a quarter of an inch between the ends. Could it be a mistake of the workmen who laid the rails? When the express had passed we looked out for the joinings of other rails. There was always a little space left; so it seemed to be done on purpose. Why?

THE PUZZLE OF THE LOOKING-GLASS

2. One day a little girl was sitting in the corner of a room on the same side as the door, so that when anyone opened it she could not see the person's face; but she found that all she need do to find out who the friend was, coming through the doorway, was to look in a mirror over the fireplace on the opposite wall. There she could see quite clearly the face and head of her friend, but she could not see herself in the mirror at all. When she got up from her seat and walked to meet her friend, she looked in the mirror, and so did her friend. They found they could see each other in the mirror as they advanced, but their own faces were not seen until they were opposite the mirror. They are puzzled about this. Can you help them with the reason?

THE SHELL THAT SEEMS SO NEAR

3. In the summer holidays, when we were bathing one sunny day, and there was hardly a ripple on the water, we could see the sand clearly at the bottom. Now, a funny thing happened. As we came down the steps of the bathing-machine to get into the water, the lower steps under water seemed quite near, and we thought the water must be very shallow; and yet we went down and down until the water reached up to our waists. There was a shell lying in the sand a little way out, which looked easy to pick up, but was really too deep down for our arms to reach without dipping our faces down under

water. We tried with the other arm, but it was no good. What was the matter? Had our eyes all made mistakes and deceived us?

THE COLOURS ON THE CEILING

4. A little boy had been ill with measles, and went to stay with his grandmother. He had to lie still on a sofa at first, until he grew strong. One day he was looking at the ceiling and saw some beautiful colours there in a row—red, orange, yellow, green, blue, indigo, violet. How did they come there? They were lovely pure colours, far nicer than those in his paint-box, and reminded him of those in a rainbow. But he saw no rainbow out of the window. He rubbed his eyes. No, the colours were still there. Then he said their names over to himself until his grandmother came. She told him about a little boy who found out about those wonderful colours. What do you think she said had made them?

THE VOICE THAT CAME FROM A ROCK

5. High up on the Alps in Switzerland people want to send messages across to the mountain on the other side of the valley, or at the bottom of it. But it takes long to walk, so they have found a way of calling to each other. See! there is a mother standing at her cottage door, wanting to call to her son, who, she knows, is far below her down the mountain. With both hands to her mouth she sends forth the cry "Come home!" not straight down to him, but towards a rock below on the opposite side of the valley. Then she waits. After a few seconds she hears the answer "Coming," not from below her, but from the opposite rock. Why did she not call straight down to her son?

THE SCENT THAT CLIMBED OUT OF A BOTTLE

6. Someone gave a little girl a large bottle of eau-de-Cologne for a Christmas present. That scent is sometimes refreshing to anyone with a bad headache. The other day the little girl's mother had a headache, so she brought the scent for her, and dabbed some with a handkerchief on her mother's forehead. She left the corner of the handkerchief in the wide neck of the bottle on a side table and forgot all about the bottle. Next morning she went to seek it, but found that much of the eau-de-Cologne had disappeared. The handkerchief was wet, as though it had been soaked with scent. It was puzzling to know how the scent had got out of the bottle. Do you know why it could not help getting out?

ANSWERS TO THE GAME OF "WHAT IS IT?" ON PAGE 2490

THESE are the answers to the History Puzzles that are to be found on page 2490:

1. King John signing Magna Charta.
2. Landing of the Pilgrim Fathers with their wives and children from the Mayflower.
3. Queen Margaret, the wife of Edward IV., and her little son, saved by a robber.

4. Luther nailing his propositions to Wittenberg church door, and burning the Pope's bull of excommunication which was sent to him.

5. Sir Francis Drake warned of the approach of the Spanish Armada while at bowls.

6. The Emperor Napoleon imprisoned in the little island of Elba in the Mediterranean.

GAMES TO BE PLAYED IN THE NURSERY

BIG boys and girls will not want to come with us now, for we are going to the nursery to have fine fun and frolic with the very little people.

HUNT THE SLIPPER

ALL the players but one—"cobblers," as they are called—sit on the floor in a circle a few inches apart. Then the customer comes and says: "Please, I want this old slipper mended. I will call for it in ten minutes."

She hands one of the cobblers an old slipper, and turns away. When she has counted up to ten, she comes back, but is told the slipper is not ready.

"I must have it," says the customer.

"Then you must find it," all the cobblers reply.

At that the search begins. Each cobbler passes the slipper on to his or her neighbour, hiding it from sight as much as possible; but should the seeker spy it and call out the name of the cobbler who has got it, that cobbler must take her place, and bring it to be mended again. The slipper must not stop in one place, but must keep passing round the circle, either one way or the other.

THE GARDEN GATE

THE garden fence is made by all the players, except one, holding each other's hands, standing in a big ring. In the middle stands the single player, while the rest dance round her three times. Then they stand still while she sings:

"Open wide the garden gate, the garden gate, the garden gate,

Open wide the garden gate and let me through."

But the "fence," as the ring is called, only answers, as it dances round again:

"Get the key of the garden gate, the garden gate, the garden gate,

Get the key of the garden gate and let yourself through."

Then the poor prisoner cries:

"I've lost the key of the garden gate, so what am I to do?"

Still dancing, the others sing:

"Then you may stop, may stop all night within the gate,

Until you're strong enough, you know, to break a way through."

At this the prisoner runs between two of the boys and girls—the "palings" of the fence—and if, by pushing, she can make them unclasp hands, one of them takes her place in the middle, and the game begins again.

HUNT THE RING

THIS game is played by all the boys and girls standing up in a circle, with the seeker inside. The ring is slipped on a long piece of thin cord or twine, the ends of which are then tied together. Each one in the circle holds this cord with one hand and passes the ring along it with the other. The game is to

pass the ring along while the seeker is looking another way. The ring may be hidden by holding the hand over it till there is a chance to pass it on. The ring must not stay in one place, and when it has been found the one who held it must take the place of the seeker.

HOLD FAST! LET GO!

You must listen to what is said in this game, and be careful to do exactly the opposite. Four players stand up, and each takes hold of one corner of a square sheet of paper or a handkerchief. A fifth player calls out: "Hold fast!" and anyone who does not let go will be out; while, if the order is "Let go!" those who *fail to hold fast* will be out. The orders must be given rapidly, one after the other, and someone is sure to make a mistake, but the last to do so, of course, is the winner.

PUSS IN THE CORNER

IN this game all the children pretend to be mice, except one, who is the puss. "Puss" stands in the middle of the room. Each mouse stands in a corner. While there Puss cannot touch them, but when they run across the room to change corners with one another she may capture any she can. No mouse should venture from a corner until she has made signs to another mouse with whom she would like to change houses, or she may find herself half-way across the room with no corner to run to. The mouse that is caught must take the place of Puss.

DUCK UNDER THE WATER

THERE should be a good many players for this game. Choose partners, and form two lines a little apart, each couple standing one behind another. The front or leading couple then form an arch by joining hands, and the last two of the line skip together down the alley of players, pass under the arch, and, stopping immediately on the other side, make a second arch. Then the next couple from the end do the same, and the next, and so on until a long tunnel is formed of lifted hands. The tunnel may be taken down by the first partners who began it lowering their arch and passing through. The next two follow, until the last arch falls, and the builders are ready for another game.

BLINDMAN'S BUFF

THOSE who want to make a great noise will have a chance now. One player is taken into the middle of the room, where a handkerchief is tied over his eyes. He is then turned round three times and told to catch whom he can. The other players run to and fro, passing as near to him as they dare, while the blindman rushes in all directions, clutching at those who seem nearest. When he succeeds in catching someone, he must guess who it is, and, if correct, the person

caught must be blindfolded in his place. If he cannot guess, he must leave go and try again.

WOLF

THE "wolf" is a player who creeps away to one side of the nursery, and hides behind chairs and tables or boxes. The "sheep" all huddle up at one end of the room, and the shepherd stands at the other. Presently he calls out to the sheep to "come home, for the night is falling."

"We are afraid of the wolf," answer the sheep.

"The wolf is away!" cries the shepherd.

Then the sheep all run across. Out jumps the wolf and catches whom he can. The game lasts till there are no sheep left to be caught.

BINGO

THE players join hands in a ring, with one of their number, who is called the "miller," in the centre. Then all, still holding hands, dance round and sing:

"The miller's mill dog lay at the mill door,
And his name was little Bingo:
B with an I, I with an N, N with a G, G
with an O,
And his name was little Bingo."

Then as they stand still again the miller cries out "B" and points at one of the players in the ring, who must say "I," the next to her "N," and so on, until the little dog's name is spelt. The first player to say the wrong letter has to change places with the miller.

FEATHER AND FANS

A FLUFFY feather out of any cushion will do for this game, and if there are not enough fans to go round, stiff pieces of paper or thin card will do quite as well. Draw a line across the nursery floor, and let half the number of players be on one side, and half the number on the other. When all are ready, toss the feather into the air and keep it up with the fans. No players must leave their side of the line, but should do their best to stop the feather sailing across it. Those in whose country it falls at last lose the game. Of course, the feather, while in flight, must not be touched.

A GOOSE MARCH

ALL the players but one (who is the officer) form in a line, one behind the other, but a little way apart. When ready, the officer cries: "March!" Away go the soldiers at a rapid step, till suddenly the officer calls out: "Halt!" Anyone who bumps against his companion in front, or has both feet on the ground, is sent to the back of the line with a bad mark. The order to "March!" or "Halt!" is given as many times as there are "soldiers," and in the end the bad marks are counted, the one with the smallest number being the winner.

BRIDGE-BOARD

A BRIDGE-BOARD is a long, thick piece of wood with a number of arches cut in it. If we have not one, we can build a very good board from a box of bricks, or even by standing our smaller books in a row, and placing

others across the tops. Each arch or opening of the bridge should be marked with a separate number, and one of the players, called the "keeper," should stand by it at one end of the room, while the rest go to the other end with marbles. Turns are then taken to roll the marbles through the bridge, the one who sends them under the arches with the highest number winning the game. When we build our bridge we can make the arches whatever size we like. They should be large if we choose to roll the marble from a distance, and small if we are going to stand near.

A HOUSE PAPER-CHASE

FOR this game we shall want a large number of pieces of square paper about the size of a playing-card. On each slip a figure should be marked plainly—thus, 1, 2, 3, and so on, up to 20 or 30. These slips are given to the boy who is the "hare," with permission to drop them one by one, in the order of the figures, anywhere he likes in the house, but always where it will not be very difficult to see them. After waiting a minute or two, the hounds start in pursuit, but must follow him only by finding the scraps of paper in their proper order. The hare does all he can to avoid being seen until he is safe back in the nursery, but even if seen he cannot be caught unless the hounds can produce all the slips of paper that he has scattered. If they make a prisoner of him, and he can show that there are numbers missing between those he still has and those in the hands of his captors, he must be set free again. If there are only one or two thus missing the chase becomes exciting, because he must not return to the nursery till all his slips are parted with.

TIT TAT TOE

DRAW a large circle on a slate with a very small one in its centre, then from one to the other draw lines like the spokes of a wheel, and put a number in every space between the spokes from 1 upwards. The more spokes and spaces the better. In the small inner circle 100 is written. The first player then begins by holding a slate pencil upright with its point in the space marked 1. Closing her eyes, she shifts the pencil round the wheel step by step, repeating these words:

"Tit, tat, toe, my first go,
Three jolly butcher boys all in a row.
Stick one up, stick one down,
Stick one in the old man's crown."

With the last word she opens her eyes, and writes down the number of the space in which the pencil is resting. The next player then takes the pencil and begins "tit, tat, toeing," and when all have had a turn the scores are counted up, the one who has the highest number winning. Any player who puts the pencil into the inner circle scores 100, and wins at once, while those who let it rest on a line or spoke must pass it on to the next without counting anything.

SCHOOLMISTRESS

THE mistress stands in front of the class and, beginning with the scholar at the top of the form, she asks questions as quickly as she can think of them. She begins with the letter A, and forms her questions so that the answers begin with this letter. For example: "The name of an English queen beginning with A." If the answer is not given before she can count up to ten, she goes to the next scholar, and the next, until one is reached who replies. This scholar goes to the top of the class, and another question is asked on the letter B, and so on through the alphabet. It is *quickness* more than anything else that makes the fun in this game.

THROWING LIGHT

TWO players secretly choose between them a word that has two meanings, such as "Ball"—a thing to play with, and "Ball"—a dance. They then begin talking to one another aloud, referring to the word without using it. One will say: "I played with it in the garden this morning." "Yes," says the other, "and a friend of mine went to one last night."

Those listeners who think they have guessed what the word is may join in the conversation, but must pay a forfeit if mistaken.

TELEGRAMS

ONE of the players calls out that a telegram of ten words has to be sent off describing, let us say, the Boat Race, and the words must begin with certain letters. He mentions ten letters of the alphabet which he has chosen, and each player puts them down on a slip of paper. Five minutes are given for the writing of the telegrams, and when the time is up they are all read out aloud. Clever players sometimes make very funny telegrams, and a great deal of fun can be got out of the game. A prize can be given for the best telegram.

THE GENTEEL LADY

THOSE who take part in this game will want very good memories. It is begun by the second player from the left-hand end saying to her neighbour on the right: "Good-morning, genteel lady, always genteel. I, a genteel lady, always genteel, come from that genteel lady, always genteel (pointing to the girl on her left), to tell you that she owns an eagle with a golden beak."

The neighbour receives this information with a bow and repeats it to the girl on *her* right, adding at the end the words "and silver claws." This third player then bows and passes it on, adding to the sentence a remark about the eagle's feathers. Each player adds something of her own, and the first girl who fails to repeat, word for word, the message she receives has a paper spill, called a horn, stuck in her hair. The player sitting next then turns to her right-hand neighbour and takes up the tale in these words: "Good-morning, genteel lady, always genteel. I, a genteel lady, always genteel, come from this *one-horned* lady, always one-horned, to tell you," etc. Every mistake means a fresh horn, and the game often ends by all "genteel ladies" becoming "one-

horned," or "two-horned," or even "four-horned," because with every repetition the words get more difficult to remember.

GENERAL POST

ALL the players sit round the room in a large circle, and one, who is blindfold, stands in the middle. Each player takes the name of a town, and the leading player makes a list of these, from which he calls out now and then, thus: "The Post is going from Boston to New York," choosing towns on opposite sides of the circle. Boston and New York jump up and slip across to each other's seat, the blindman doing his best to catch one of them as they pass. When several towns have changed places, and the blindman has failed to make a prisoner, the leader cries out "General Post," when all must jump up and cross over to opposite sides. In the hurry and confusion the blindman is sure to catch someone, who takes his place while he becomes one of the towns.

WINKS

A CIRCLE is formed of chairs, one only of which is unoccupied. Behind each chair, including the vacant one, stands a player whose duty it is to prevent the person sitting in front from leaving his chair, though no effort must be made to check him until he shows some intention of escaping. The guardian of the vacant seat looks round the ring and winks to someone to come and occupy it. The player thus called must be very alert, or the one behind the chair will clutch him before he can get away. One touch is enough. If successful, the chair left becomes the vacant one, and the player behind it must lose no time in trying to get another tenant by a wink or a nod at someone else. The faster the changes take place the greater the fun, but the guardians behind the chairs must, of course, be as quick as they can to avoid losing their chairs.

OBJECT GAME

THIS is good practice for the memory and the power of observation. Each member of the party has a piece of paper and a pencil. When all are ready, someone enters the room carrying a tray with about twenty small articles on it. The tray is placed in full view of everybody and left there for one minute, during which time no one must touch pencil or paper, but must simply look at the contents of the tray. At a given word it is carried away, and the players must write down the names of as many of the articles as they can remember having seen. Only a certain time is allowed for this, and those who remember the greatest number of articles win the game. The objects chosen should be of the simplest kind—a black pin, a tiny piece of coal, some birds' seed, a piece of fluff, a hair, and so on.

YOU MUSTN'T LAUGH!

ALL sit in a row round the fire and look solemn. Then the first player says: "Haw-haw!" which is repeated all down the line, one after another. Those who cannot do this without laughing afterwards are declared out, and the game begins again.

CONTINUED ON 2573

THE GROWTH OF THE GERMAN EMPIRE



If we compare together this map and the one below we can see how much the power and influence of Prussia have grown in Europe since the fall of Napoleon Bonaparte. At the Congress of Vienna, in 1815, which settled the map of Europe for a few years, Austria was the supreme power among the German-speaking nations; and, although Prussia was given nearly all the territory she had lost in Napoleon's wars, and much more besides, her influence did not extend beyond her own land. From this time there was great jealousy between Prussia and Austria.



With the coming of Bismarck, Prussia's power and influence grew until it reached out far beyond her own territory. This map shows Central Europe at the close of the Franco-German War, in 1871, and we see in the dark shaded part how Prussia's influence had extended over all the other independent German countries except Austria. These countries do not belong to Prussia, but, as parts of the new German Empire, they all acknowledge the power and follow the lead of Prussia. Austria has ceased to influence other German nations.



Representatives of the nations sitting at Vienna to restore order to Europe after Napoleon's fall

THE MAKING OF GERMANY

"WE must utterly break up Germany," were Napoleon's words and aim all through the years of bewildering, ever-changing conditions in Central Europe, when peace never once came to stay. At the most there were occasional stoppages in the war, while he was trying to disunite the German-speaking peoples. These were strong, while bound together, like the bundle of sticks in the fable, but easily destroyed when they fell apart. Unhappily, there were many jealousies and divisions among the states from one cause and another, and after the battle of Austerlitz several of the states joined together in a union "protected" by the French, in league against Austria and Prussia. Austria lost her fairest provinces after Austerlitz; Prussia, half her territory after Jena. When the noble-hearted and beautiful Queen Louise of Prussia begged Napoleon to have some mercy on her unhappy country, the insulting answer sent to her was—a map of Silesia, that rich province won from Maria Theresa by Frederick the Great, encircled by a golden chain and a pendant heart.

What a terrible set-back it was for the young, rising nation to have

CONTINUED FROM 2530



its army wiped out, French soldiers occupying the country, Napoleon ruling from Berlin, whence he sent out his Berlin Decrees about the trade of England. None could gainsay this conqueror, who could race about all over Europe—before there were any trains!—without sleep or rest; who could fight five battles on five successive days, and overcome every difficulty, even the snowy Alps. When Napoleon was at the very height of his success, between 1807 and 1809, it could be said that all Europe was practically under the power of two emperors. They were "The Man from Corsica" and the Emperor of Russia.

We have seen on page 2276 how the tide turned in the bitter Russian campaign. Central Europe was not slow in seizing the chance, and the whole German people rose against the hated yoke, eager to wipe away the dishonour of its defeats and subjection.

Prussia was particularly eager to drive out the French garrisons, and people hastily gave money or labour, or volunteered to fight; and nothing was too great or too small to do which might help to recover what had been lost.

The famous general, Blücher—he who later helped Wellington at Waterloo—earned in one of the first

battles at this time the name of Marshal "Forwards," from the soldiers who followed the impetuous leader to his thunderous cry of "Vorwärts!" He but expressed the spirit of the time. At the "Battle of the Nations," fought near Leipzig through four long, terrible days, Napoleon was beaten at last, and Germany freed from the French.

THE BREAK-UP OF NAPOLEON'S EMPIRE, & TEN YEARS OF DISORDER IN EUROPE

The empire of the "successor of Charlemagne," as Napoleon loved to call himself, fell apart even more quickly than it had been formed. It was not an easy task to bring back order in Europe, especially when many of those concerned at the Congress of Vienna proved to be jealous and greedy. But it was accomplished in some fashion at last, in spite of the thrilling interruption of Napoleon's escape from Elba, and the brilliant Hundred Days in which his genius made a last effort before the final and crushing defeat at Waterloo.

Pitt was right in that sad remark he made about the map of Europe, after Austerlitz, just before he died. It lay unrolled again before the Congress of Vienna, ten years later. Let us study it, too, and get clearly in our minds the names of the chief states of the German-speaking people, and where they lie in that great central heart of Europe, with its mountainous masses to the south, its great plain crossed by many rivers to the north, its grand waterways of the Rhine and the Danube flowing north and east from its south-western corner. It is their natural features which have remained the same, unchanged through the centuries, in every map that has been drawn to show the constant changes that have taken place in the sharing-out of the land by the movements of men.

MOUNTAIN PEOPLE WHO LIVED QUIETLY AMID GREAT CHANGES

We have seen how these changes arose, by conquest, by the marriage of heiresses, by the division of states among different members of a family.

Perhaps the most stable of the provinces has been Bohemia, so safely sheltered by its semicircle of beautiful mountains, the Giant and Ore Mountains, the home of endless stories of gnomes and dwarfs. The Bohemians belong to a different family of

nations from the old Teutons, or Deutschen, called the "Slavs," but they have counted as dwellers in a German state for nearly a thousand years. Their history touches that of England on the field of Cressy, when their blind old king was killed, and the Black Prince adopted his motto and crest of three white feathers, so well known to us through their use by succeeding Princes of Wales. Bohemia was the country of John Huss, a reformer who followed the teaching of John Wyclif. On its borders we can find Austerlitz. Its capital, Prague, is on a branch of the Elbe, one of the great German rivers flowing northwards.

Another state that has existed with very little change in its territory through history is Hungary, and it is also not a German nation. The Hungarians to this day keep up their own language and customs. Their ancestors, the Magyars, settled about the Danube where it takes its sharp bend southwards, near the modern capital, Budapest. The old capital is Presburg, to which, as we saw on page 2530, Maria Theresa fled for help when sore pressed by her enemies.

VIENNA, THE CAPITAL OF AUSTRIA, BAVARIA, AND SAXONY

Both Bohemia and Hungary long ago became parts of Austria, the state on the east border of the empire, which shifted its boundaries as the years went on, acquiring land or losing it, not only on its "home" edges, but, as we have seen, across land and sea, in the Netherlands, in Italy, in Spain. After the Congress of Vienna, the "Emperor" of Austria, as he had styled himself some years before, to keep pace with Napoleon, kept the beautiful eastern part of the Alps and lands on the Mediterranean waters, besides Bohemia and the sister state of Hungary. The great capital of this Austrian Empire is Vienna, on the Danube, which we have seen taken by the Turks in the time of Louis XIV., and by Napoleon before Austerlitz.

Bavaria is the neighbour of Bohemia and Austria, and its history has been much interwoven with theirs. So much has been taken from one end, and added at the other, that there is little of the original ancient duchy existing under the old name. Its fine capital, Munich, is on a tributary of the Danube, the

THE SURRENDER OF AN EMPEROR



The Franco-German War was a series of brilliant triumphs for Germany and a succession of blunders on the part of France. The French Emperor, Napoleon III., and his army marched into a valley at Sedan, where, as a French writer, Victor Hugo, has said, they were "without order, without discipline, a mere crowd of men waiting, as it seemed, to be seized by an immensely powerful hand." The Germans surrounded them and compelled them to surrender. Here we see the beaten French Emperor meeting Bismarck, Germany's "Iron Chancellor."

"Iser rolling rapidly," so vividly described in Campbell's poem, "Hohenlinden," which is given on page 1035, where a French army crushed the Austrians in the early days of Napoleon's successes.

As for Saxony, north of Bavaria and Bohemia, so complete has been the shifting of its boundaries that the old land of the Saxons, from which the early conquerors of Britain came, has nothing in common with the Saxony of later times, except the name.

A part of the district where Saxons jostled Angles is now Hanover, lying about the root of the Danish peninsula, which separates the North and Baltic Seas. This district is particularly interesting on account of the free towns, such as Hamburg, Bremen, and Lübeck, which rose up in it, doing so much for trade and liberty in old days, and also because, for over a hundred years, the ruler, or "elector," of Hanover was also king of England. Dresden is the capital of Saxony, and is on the River Elbe.

THE BEGINNINGS OF THE GREAT KINGDOM OF PRUSSIA

To find the beginnings of Prussia, now a great kingdom stretching from the borders of Russia, along the Baltic Sea, and across country to the Rhine, we must look for the old province of Brandenburg, between Bohemia and the Baltic. Gradually, during the last 200 years, East Prussia, West Prussia, and Silesia were joined to it. At the Congress of Vienna, Prussia gained half of Saxony, and large districts on the Rhine.

It is strange that the name of this most thoroughly German state is that of the conquered old land of the alien Prussians, just as the English to-day call themselves and their land British and Britain. Berlin, the capital, stands on the River Spree, which connects with the Elbe, at the meeting of the ways in the great plain. It first owed its growth to the rulers who laid the foundations of the greatness of Prussia.

To the east of Bohemia and Brandenburg there lay in the past, about the time when Columbus was sailing the clear Caribbean Sea, the large and flourishing kingdom of Poland, a "Slav" country, like the others on the eastern borders of the empire. To-day the name of Poland is wiped off the map. Its frontier was ever changing, and at times,

when the country was exceptionally weak, or under bad rulers, its stronger neighbours have swooped down upon it, and shared its lands amongst them. Frederick the Great of Prussia, Maria Theresa of Austria, and the Emperor of Russia, all helped in sharing out Poland.

THE EMPERORS AND KINGS TRY TO BRING ORDER TO EUROPE

We have seen how Francis II. of Austria laid down the sceptre of Charlemagne and the crown of the thousand-year-old Roman Empire. This empire had kept together in a loose sort of way—looser and looser towards the end—these old states of Germany, and many more; and now, after the Congress of Vienna, we see a confederation of German states, consisting of many smaller states, and two very large and powerful ones—the empire of Austria and the kingdom of Prussia. These were very jealous of each other's powers, and it was soon felt that the arrangement could not be a lasting one, especially as important changes in every direction, but chiefly in men's minds and thoughts, were seen to be hurrying on all over Europe.

It was the emperors, kings, and princes who settled matters at Vienna, and their idea was to restore things, as far as they could, to what they were before Napoleon's wars upset everything. But the people could now no longer be forced to pay taxes they had had no voice in settling, to obey laws they had had no share in making, or to fight in wars arising out of their princes' quarrels.

THE GREAT LONGING OF THE PEOPLE FOR UNITY

The people wanted Parliaments, with real representation of all classes; they wanted open courts of law and trial by juries; freedom of the Press, freedom in speech, and, above all, in religion. Slowly, through the years that followed the settlement of Europe at Vienna, the friends of freedom gained what they wanted. The revolutions in France during this time, of which we read on page 2277, especially the one in 1848, had a great influence in Germany; many of the rulers gave way on contested points for fear of being sent away, like Louis Philippe.

Another strong desire, besides the longing for liberty, was working in men's minds through all these years. It was a growing wish for unity, the joining

together of German-speaking states, so that they might show one undivided front to the rest of the world, especially in times of war and trouble. The very efforts that Napoleon had made to crush what small measure of unity the old Germany possessed had been the means of giving it fresh life, for what draws any family together closer than a common sorrow, or working together with a common object in view?

THE BLESSINGS OF PEACE, AND THE UNION OF THE GERMAN PEOPLES

But not only at the Battle of the Nations was there the sympathy of common effort, but the very hardness of the struggle for freedom in each separate state brought men, hitherto divided, nearer together. Then a great change in the customs, or taxes, hitherto set on all goods as they passed the frontiers of each state, was of immense help in opening out intercourse and good-fellowship as well as trade, for the barriers were done away with, and with them the expense of keeping up guarded frontiers. Most states joined Prussia in this customs union, but not Austria.

Then there were, besides all this, the blessings that came with peace. People were no longer afraid to build factories as hitherto, lest they should be burnt or destroyed by an enemy's army, and trade grew as inventions and machinery of all kinds developed and were worked by steam. When the shining steel rails, laid down in state after state unceasingly, drew distant and out-of-the-way places closer together by making travel easy and quick, people could not only trade more, but could get to know each other better, and so become less ignorant and narrow-minded.

BISMARCK, THE BOY WHO WAS BORN IN THE YEAR OF WATERLOO

In all the growth that was going on in these middle years of the nineteenth century, it was Prussia—the youngest of the kingdoms—that grew the fastest, and more and more took the lead in the German family of states.

Both times and men were ripening for the coming change. In the very year of the battle of Waterloo there was born a boy who grew up very clever, very determined, very far-seeing, through the years of change and growth in Germany. He made his way early into the Parliament of the day, and learnt

much about other countries by being ambassador at Paris and St. Petersburg. Then his sovereign, William I., had need of him, and he became the king's chief Minister. This man was Bismarck, who saw plainly from the first how Prussia could rise to greatness, and set his face, like a flint, to make it great.

When the army had been reformed and strengthened, William I. and Bismarck were ready for the first step. Prussia went to war with Denmark about the two provinces of Holstein and Schleswig, between the Baltic and North Seas, which were claimed by both Denmark and Prussia. Austria joined Prussia in this war, and soon the two giants had their way over the smaller Power. Then, when Bismarck had settled the dispute that arose between the giants as to what should be done with the conquered provinces by taking possession of them for Prussia, he was ready for the second step.

THE GREAT MARCH THROUGH THE AVENUE OF LIMES IN BERLIN

This was war with Austria; the long-smouldering jealousy of the two rivals must now be settled by force of arms. The great General Moltke came to the front, and in seven weeks the war was finished by the final victory at Sadowa, in Bohemia, and the appearance before Vienna of the Prussians.

There is, in the city of Berlin, a wide street nearly a mile long, with an avenue of lime and chestnut trees. It is called "Unter den Linden," meaning "under the limes." At one end of the avenue is a magnificent gate, looking towards the old province of Brandenburg; at the other is the fine palace of William I.

Back under that Brandenburg Gate passed the victorious troops, the king welcoming them and leading them up the Unter den Linden, with Bismarck and Moltke, amid the girls scattering flowers, and the waving banners, and the music, and the enthusiastic crowds cheering and shouting "Hoch! Hoch!" to those who "in seven weeks had sped through Frederick's Seven Years," and had thus, almost at a blow, settled the leadership of the Prussian nation.

The peace that followed this war brought about great changes. New lands were added to Prussia; Austria lost some of hers. The old German Confederation was done away with, and

a new one formed of Prussia and the states north of the River Main, which runs into the Rhine at Mainz. A House of Commons, called the Reichstag, was formed of members from all the states that had joined the union, and in this Reichstag were to be discussed all the questions affecting the states as a whole, each state still keeping the government of its own affairs.

THE THIRD STEP IN THE SHAPING OF THE GERMAN EMPIRE

But Austria, so long the leader and head of the old Roman Empire, was shut out. Then, when the sharp rent between the two rival Powers was complete, the King of Prussia on one side of the mountains of Bohemia, the Emperor of Austria on the other, Bismarck was ready and waiting to take the third step in his plan for making Prussia great.

This was the chance of war with France. It came even sooner than he had dared to hope. We have already seen how Napoleon III. was disturbed at Germany's growing power, and how he wished to make his usurped throne safe by dazzling the nation with military glory; especially did he wish to please his people by securing all the land right up to the Rhine. So he took the first excuse that would serve to declare war. This happened to be that a Prussian prince was named as a king for Spain.

Upon this there followed one of the most surprisingly rapid and dramatic wars ever fought in Europe, the details of which many of our fathers and mothers read day by day in the papers, for it is hardly forty years ago. Visitors staying in Germany at the time recall the story of the intense excitement just before the war broke out.

HOW THE FRENCH ARMY WAS DRIVEN INTO A TRAP AT SEDAN

Students in the university towns shouted themselves hoarse all night long with patriotic songs and loud hurrahs and "hochs!" Trains were crammed night and day with soldiers on their way to the front; and there was a constant stream of stores, food, and ambulances being got ready for despatch. Enthusiasm rose to a height when the South German States, who had not hitherto joined the new Confederation, threw in their lot with the Northern States led by the King of Prussia. Only Austria was shut out.

France was greatly excited, too, and the soldiers set out for the Rhine, shouting valiantly: "To Berlin." But they were not ready for war like the Germans. In the course of a fortnight the whole frontier was lined by German troops ready for action. And then—the pity of it!—in the beautiful, peaceful woods and passes of the Vosges Mountains, and the plains about the Rhine, the awful scenes of war brought misery to thousands of innocent people.

In the course of a month a large part of the French army was caught in a trap, and soon at Sedan Napoleon wrote to the King of Prussia: "As I have not died at the head of my troops, I hand over my sword to your Majesty." The whole French army surrendered: thousands of men, with officers, generals, marshals, cannon, and horses. An army of 135,000 men ceased to be.

Great was the rejoicing and excitement in the Unter den Linden, and before the king's palace when the telegrams reached Queen Augusta. She had to come to the balcony again and again to respond to the people's cheering.

THE BITTER NEWS THAT REACHED PARIS, AND THE FALL OF THE EMPEROR

When the bitter news reached Paris, Napoleon, a prisoner, was deposed, and a Republic proclaimed, and the new Government insisted on going on with the war. Within a fortnight of Sedan, the Germans were besieging Paris.

A second French army, even larger than the one defeated at Sedan, was now surrounded at Metz; but, in spite of this second disaster, the French gallantly tried to drive the Germans from Paris. Bismarck was now ready for his fourth and last step.

During this time the states of Germany, drawn together in fighting a common foe—their deadliest enemy in the past—took counsel together and decided that, the arms of Prussia being triumphant beyond all question, the moment had now arrived to put a seal on the unity of feeling that was growing stronger and stronger, by asking William I., the king of the victorious and leading state, to become the German Emperor, the head of the confederation of kings and princes.

How strange it seems that the brilliant scene, when William I. was hailed with wild delight as German Kaiser,

THE BIRTH OF A MODERN EMPIRE



The birth of the great German Empire was first announced to the world in the splendid Hall of Mirrors at the palace of Versailles. How strange that such an event should take place in the palace of Louis XIV., where so many plots had been hatched for the destruction of Germany ! William I., King of Prussia, was proclaimed German Emperor on January 18, 1871, while his army was besieging Paris ; and here we are shown the enthusiastic scene as the various German states became one mighty empire. The new emperor is standing on the dais, and facing us are Prince Bismarck, in front, and Count von Moltke, the men who made the empire.

surrounded by princes and generals, should, by the fortune of war, take place in the great hall of the superb palace of Versailles, built by the arch-enemy of Germany, Louis XIV., the hall in which so many plans had been discussed for Germany's destruction.

This was on January 18, 1871. By the month of May the peace with France was arranged, and the Emperor William I. and his great Minister, Bismarck, were free to carry out their plans for the union of Germany, under the leadership of Prussia. They had by no means an easy task through the twenty years that followed.

The people in the various provinces had old jealousies and dislikes to overcome, and they still differ very much in

were made to find new markets for whatever the country produced, and to open up suitable uses for raw materials easily obtainable from other countries. Arrangements were made to spread out the workers of some of the poorer and more distant states, bringing them where work was to be done. One kind of money and one kind of weights and measures were introduced all over the empire. The laws of different states were brought into line, and a splendid postal and telegraph service was set up.

Another very important point was that the railways, which began to cover the various states with their network of lines, were gradually brought under the control of one central management.



THE FRENCH ARMY MARCHING TO BATTLE AGAINST THE GERMANS IN 1870

opinions, in ways of life, and in religion. For North Germany is chiefly Protestant, and South Germany is chiefly Roman Catholic; while in the Rhine provinces are many of both faiths.

Bismarck, the man of iron, steadfastly kept to his one aim, and had many struggles with various parties, both in and out of the Reichstag especially with the Reichstag itself when he wanted grants of money to spend on the army. "I hope they will give it," said he, on one occasion, "or we shall have to take it as we can." The enormous sum of money that France had to pay her, after the war, gave Germany much to spend on improvements of every kind. Great efforts

There were thousands of sorrowful people standing about the Unter den Linden and in the square before the palace when the old king, Emperor William I., lay dying. It had been given to him, with Bismarck, to accomplish a most wonderful work; and Germany loved him as a father.

His son, the husband of the English Princess Royal, afterwards called the Empress Frederick, reigned for only a few months; but in that short time he built up a memory for all people and all time in the example of noble courage with which he met suffering and death.

In the reign of his son, William II., we pass to the story of Germany to-day. The next story of Germany is on page 2747.



The land crabs of the West Indies go inland from the sea to live, but return to the sea to lay their eggs. When marching down to the sea they climb walls and cliffs, nothing stopping them.

SEA ANIMALS IN ARMOUR

At first sight it might appear that the sea animals which live in shells would prove dull company. But that can only be so to those who do not trouble to study the lives of these creatures of the deep. We shall find that they are as interesting as anything in the whole of Nature's books. The characters for the present story are among crustaceans, the animals that live in shells or living coverings, like the crabs, lobsters, crayfish, and shrimps; and molluscs, the soft-bodied animals which are provided with shells, like the mussels and oysters. Cuttle-fish are molluscs; but we have dealt with them already. Then there are the gastropods, a sub-family including the whelk and his kindred.

Let us first consider the story of the crabs. This is a family of many sorts, not all living in the sea, placed at the head of the crustaceans. The one with which we are all most familiar is the crab which comes to table. The head, throat, and what we may call the chest are all joined together, and from here the ten legs, arranged in five pairs, grow out. They do not always present this form. When young, the little crab looks quite unlike its

CONTINUED FROM 2452



parents. It undergoes several changes from the state in which, lacking legs and claws, it first peeps forth into the world. The stages through which it passes show us what the crab was like in the old, old days. It attains its changes by what in the birds we call moulting. Again and again it casts its outer covering, and with each new coat comes a greater likeness to its parents, until it appears before its family in a handsome little shell, with all its legs fully mailed, and its claws hard and active, ready to do battle with its enemies, or to grasp the food which it needs. When this stage has been reached, all that it has to do is to change its size, not its form.

Little crabs in full armour of shell must change into big crabs in full armour of shell, and big crabs must become still bigger. Still the moults go on. It is a very inconvenient and painful process, and so hard that very many crabs die when moulting. Fancy if every now and again we, when growing, had to climb out of our skins! Well, that is what the crab must do. His fat little body has grown too big for his shell, and out he must come, or burst. But how can he withdraw

himself from that stiff, unbending mail? Nature has provided a way.

We have all heard of, and probably seen, a watery crab, so called. Crabs in that condition are not fit to eat. The flesh of the crab has really become watery, all soft, and able to be compressed into a small space. That is to enable him to crawl out of his shell.

THE WAY IN WHICH THE CRAB ESCAPES FROM ITS HARD SHELL

He has strong claws and thick legs by this time, and how is he to get them through the tiny joints by which the shells of the claws and legs are fitted to the rest of the shell? He simply has to draw them back, up the shell, and through the joints. The watery condition of the flesh enables the limbs to be compressed. But it is a serious business. Think what a struggle the big male crab must have! His claws, prized by those who eat crabs, are so big that they make him worth five times as much money to the fishermen as the female crab is. Well, they have to be dragged out of the old shell, just in the same way as have the smaller claws of the female. There is no royal road to freedom from the old shell.

While the old shell is being made ready to come off, there is a new shell forming over the flesh of the crab underneath; but it is quite soft and flexible until the old one has been moulted. The great effort is made, and the old shell is cast, seemingly without a rent or split in it. A soft-bodied crab crawls miserably forth, and scurries away into a crevice in the rocks to hide.

THE TERRORS OF THE CRAB WHICH HAS LOST ITS SUIT OF ARMOUR

He is now as soft as can be, and any other crab would snap him up at once. It takes many hours, or it may be days, for the new shell to harden. Until that has happened our little friend is in mortal terror that some hard-shelled brute shall come along and give him a nip; but when the new shell is solidified, Master Crab is ready to do battle against all the rest of the crabs. In fact, he rather likes that. He is a rascal to fight. He does not in the least mind biting off an enemy's claws; and he is just as ready to sacrifice his own. What does he care? Claws will grow again. It may take several moults to do it, but in time the claws will bud

out and refit him, just like the new tails which grow on the lizards, of which we have often read.

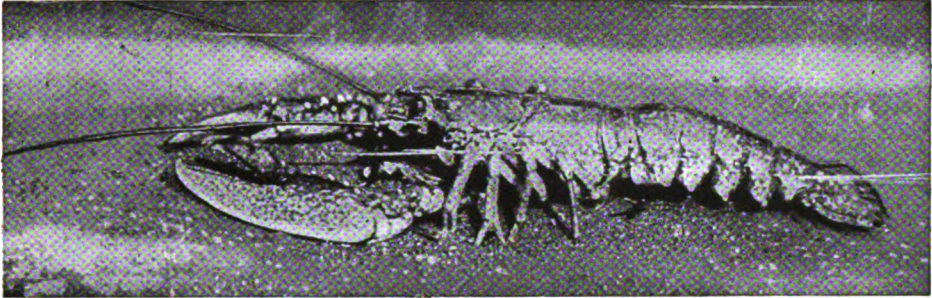
We have eight or nine species of crabs round our coasts. There is the common shore crab, which every child has caught at the seaside. There is the big thorn-back crab, which acts as a capital scavenger in eating up the refuse round the coast. There is the crab with legs and claws so slender that it is called the slender spider-crab. There is the swimming crab, which has two of its legs shaped like a pair of oars. There is the wicked-looking little crab covered with coarse brown hair, which we call the devil-crab; and among the others there is the little pea-crab. This is an interesting variety. Like the hermit crab, it goes into hiding. But instead of taking up its home in the empty shell of a whelk, it dives into the open shell of a living mollusc, and there lives like the hermit in an anemone, sharing the food which, by opening and shutting its shell, the mollusc draws in.

THE MARCH OF THE CRABS OVER WALLS AND CLIFFS TO THE SEA

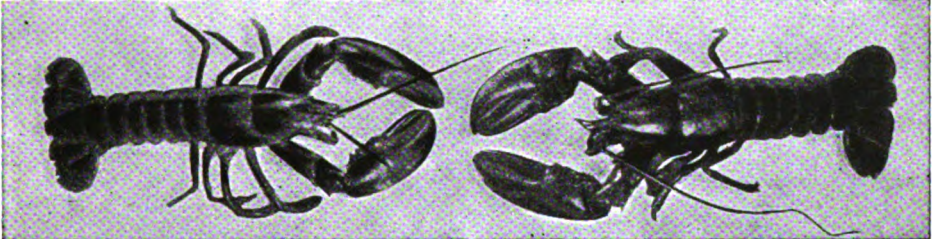
Abroad they have more interesting crabs than ours. Some of them have made themselves so much at home on shore that they have altered the character of their breathing. Our crabs breathe by way of gills, but these others can actually be drowned in water. Some crabs frequent fresh-water streams and ascend mountains. One of the most remarkable is the West Indian land crab. Here is a creature which makes its home two or three miles from the sea. But when the females wish to lay their eggs, they do not lay them and carry them attached to their bodies as our crabs do; they must make their way back to the sea to lay them in the sand. So all the crabs gather together into an army, the males leading the way.

There may be enough to form a host more than a mile long and forty yards wide. On they march, regardless of all obstacles. They go on as resolutely as the lemmings. Houses and walls and cliffs do not stop them. They never turn aside, but keep straight on, though hundreds may be killed in the climb. Arrived at the sea, the females lay their eggs, and the annual migration is at an end, and the old ones are free to make their way back inland.

CREATURES THAT GIVE UP THEIR SHELLS



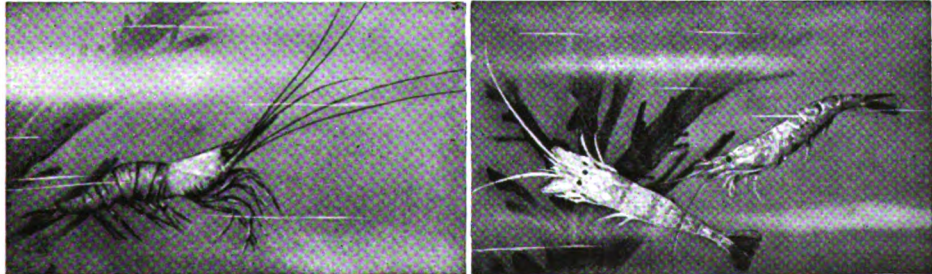
The lobster which we see at the fishmonger's is bright red, but when alive it is bluish black. Here we see one in all the glory of its armour of shell, ready to do battle with the best of lobsters, for any cause or no cause at all.



Now we may see the difference between the lobster with his shell and without it. On the left he is without armour. On the right we have the shell out of which he has drawn himself, to remain defenceless till a new one forms.



The crayfish, a sort of fresh-water lobster, can live 15 or 20 years, but it has a terrible life at the beginning. It has to moult 15 times in three years—eight in the first year, five in the second, and two in the third.



The first of these pictures shows a prawn. The second is a picture of shrimps. Prawns are beautifully coloured and armed with a notched spear. Shrimps, to avoid enemies, are coloured just like the sandy water in which they live. They have such a powerful sense of smell that even blind shrimps readily find food.

The photographs on these pages are by W. B. & S. C. Johnson and others.

Another land crab, called from its fleetness the swift land crab, does not go so far from the water; but, still, it cannot remain long in the sea. These crabs live together on the beaches, each making a burrow for itself. When threatened with danger, they run with great speed to their holes. Should a crab get to the wrong burrow, the owner makes a scraping noise, and the lost one bolts off, braving the danger from any foe in the open in preference to entering the home of one of its own kind. Another famous land crab is the calling crab. This is a silly name for it, as it does not call. One of its claws is extremely large, and as the crab runs—which it does with great speed—it holds this claw aloft as if beckoning. All crabs are supposed to possess intelligence, and this one certainly does. He makes a big burrow a foot or more in depth, and is very particular to keep his home clean and tidy.

THE SURPRISING CLEVERNESS OF SOME OF THE CRABS

A gentleman who was observing the habits of these crabs threw some shells towards the hole of one of them. One shell rolled right into the hole, while three remained outside. Soon the crab came cautiously out, looked here and there to see that there was no sign of danger, then seized the shell in his burrow, and carried it out to a good distance from the opening. As it returned it saw the three other shells, and thinking that these, too, might roll down the burrow, it took each one and carried it away to where it had placed the first. We should think it clever of a dog to do that; surely, then, we must give the humble crab equal credit.

The wonders of the crab family are not yet exhausted. Some of the species carry anemones in their claws to hide them either from enemies or the creatures which they mean to attack; some permit other shell-fish to settle upon them, so gaining shelter from observation. But the strangest of all is the crab which lives on cocoa-nuts. This is called scientifically the *birgus latro*, and lives in the islands of the Indo-Pacific seas. The biggest of all the crabs, it makes its home by burrowing deep at the roots of the cocoa-nut trees, and its food comes from the nuts which fall. Taking a fallen nut, it

strips off the fibre with its great claws, then hammers away at the "eyes" of the nut until an opening is made. Through this opening or openings the crab thrusts its smaller claws, and so drags out the meat of the nut. It may even thrust in the smaller claws and swing the nut bodily upon the ground to smash it. This crab is good for food. The natives melt it, and obtain from its body sometimes as much as a quart of pure oil, which it has derived from the cocoa-nut.

HOW THE LOBSTER LOSES CLAWS IN BATTLE AND GROWS NEW ONES

In one respect the crab has his equal in the lobster—that is, in the matter of fighting. There is nothing a lobster likes better than a fight, unless it be two fights. Lobster will fight lobster without the least provocation, and the warriors will sacrifice their limbs with as little to-do as a crab, and repair the loss more quickly. They can always grow a new claw to replace one which has been lost, but, naturally, it requires several moults to make the new one as *large* as the old. One lobster which comes into our markets is the common one of the North Atlantic; the paler one, with tiny knobs upon its claws, comes from Norway. As we all know, the natural colour of the lobster is a bluish black; but when it has been boiled it changes to a brilliant scarlet. Like the crab, the mother lobster carries her eggs about with her. She lays them in the autumn, and they hatch in the following midsummer.

THE HARD LIFE OF THE YOUNG CRAYFISH WITH ITS MANY SHELLS

The young lobsters are capital swimmers, but they do not swim away from their crawling parents. The mother lobster is a really good old lady, and loves her babies. She may be seen hiding under a rock with her big claws sticking out, and the little ones playing between them. At the first sign of danger she rattles her claws, and the baby lobsters immediately run under her body for shelter.

The moult of the lobster is an even more serious matter than that of the crab, for not only does it cast its shell, but it actually casts the membrane by which its stomach is lined. In this, lobsters are resembled by the crayfish, the fresh-water lobster, which many

people eat. It is easily distinguished by its smaller claws. Little crayfish have not to begin in so strange a form as the crabs and lobsters, being more like their parents, but they have a hard life of it. Eight moults have to be got through in the first year, five in the second, and two in the third. After every moult the crayfish is soft and helpless until the new shell hardens.

THE GORGEOUS PRAWNS, AND THE SHRIMP THAT BURIES ITSELF IN THE SAND

The next step in the family takes us to the shrimps and prawns. Some of the latter, in the West Indies and in Central America, are nearly as big as lobsters. Ours are much smaller than this, of course, but those of good size are awkward creatures to handle. The long, sharp, saw-like spear with which they are armed inflicts quite bad injuries upon the hand, unless the fisherman be very careful. The shrimps are the small relations of the prawn. They are not so handsome as the prawns, which are often beautifully streaked with colour. The shrimps are, however, very active and graceful, and are so nearly like their surroundings that it is very difficult to see them when they are at rest. But that is not often. In the shallow pools where enemies cannot overtake them, they are so active that we have to be very alert with the net to make a catch. Where fishes which eat them abound, the shrimps hide during the day and wait for their food until night. They dig holes in the sand by excavating with the hind legs, sinking part of the body into the hole, then throwing the sand over themselves. Prawns and shrimps undergo the moulting process like the crabs and lobsters, and, like them, have a keen sense of smell, which guides them to their food.

THE WONDERFUL LITTLE SCAVENGERS WE MAY ALL FIND ON THE SEASHORE

Nearly related to the shrimps are those curious little things, the sand-hoppers, which we find in the sand upon all our beaches. They are first-rate scavengers, and help to keep the beach healthy when the tide is out. They will eat anything—carion or decaying seaweed. Their jump is accomplished by bending the body, then suddenly flinging it open, like the bending and relaxing of the bow which sends the arrow speeding to its mark. On many coasts we

find the sand-screw, which has to wriggle along on its side when the surface is dry, but moves with speed when moisture eases the way. Related to these is the corophium, a twelve-legged little creature with two immense horns. With the latter it beats the ground most carefully to find its pet food, the fat lugworms which live head downwards in the sand and mud of the seashore. The lugworm is bigger than the worm that we see in the garden, but twenty or thirty of these little animals pounce upon it and destroy it, just as we see ants destroy a caterpillar.

It is in the same family that we find the gribble and the wood-shrimp. These do great damage to timber by boring tunnels in it. But we can leave their performance and pass on to the molluscs to find two famous examples, the pholas and the teredo. The pholas, which we more commonly call the piddock, is a soft-bodied creature in a fragile shell, yet it can bore its way into the hardest sandstone, limestone, slate, or wood. Portland stone seems to be too much for it, because of the flinty nature of that formation. The pholas makes its two shells its hammer and chisel.

A SOFT BORER WHOSE WORK TAUGHT A MAN HOW TO MAKE A TUNNEL

It first protrudes a stout foot, and, with this to act as a sucker, it glues itself to the stone upon which it is to work; then, by the action of its shell, it slowly and laboriously grinds itself into the hard material. When it has got far enough in to make itself a home, it rests content, and burrows no farther.

The teredo is more feared and disliked than the pholas, for it does enormous damage to wooden ships, and to the timber defences of harbours, wooden supports of bridges, and so forth. It is a long, whitish worm, about an inch in circumference, but from 12 to 30 inches in length. It can eat its way through any sort of wood, though, naturally, it prefers some to others. Not content with making a channel for itself through the solid timber, it builds a tunnel of lime or shell wherever it goes. Thus it can move freely, and at the same time be sure that its boring will not cause the woodwork to collapse upon it.

It was from watching the work of this creature that Sir Isambard Brunel

got his idea for building the Thames Tunnel. He caused his men to drive rods into the mud and clay while they were protected by a shield. As the boring grew, so the shield was pushed more and more forward into the heart of the river's foundation. But behind, where they had excavated, they guarded against a collapse by building an arch-way of brick, like the tube of the teredo.

It seems strange that so dangerous a creature as the teredo should exist in such enormous multitudes in our seas. The waters of our southern coasts simply teem with them. They abound, too, on the coasts of Europe; and once Holland was nearly brought to ruin by them. Parts of Holland, as we all know, lie below the level of the sea, which is kept out by timber defences. Well, the dreaded teredo bored so rapidly into the piles that there was a danger of the sea breaking in and swamping the country. Of course, this creature has its use. In countries where there is a heavy rainfall, great floods carry trees and masses of timber down the river. These, collecting at the mouth, form a barrier which would cause the whole river to overflow its banks for perhaps hundreds of miles. The teredo bores the trees so that by the action of the water they are broken up and drift away piecemeal.

HOW SHIPS AND HARBOURS ARE GUARDED FROM THE DREADED TEREDO

Happily, we do not need such assistance in civilised countries, and our only thought in regard to the teredo is how to keep him at the greatest distance from the timbers which we sink in the waters. To defeat the teredo we have to cover the bottoms of ships with copper, to sheathe our sea timbers in copper, or stud them with iron nails. Even the latter fail if the little gribble can find a space between the heads of the nails, for he bores a way which loosens the nails and makes a path for the wicked teredo.

From here we must turn back for a moment to page 171 and the three pages which follow, and see again the life-story of the oyster, and the way that it makes the beautiful pearls, and the mother-of-pearl lining of its shell, which we use for the handles of knives and many other purposes of use and decoration. We need not go over that

again here, but must pass on to the mussels, which, like the oysters, are called bivalves. That means, of course, that their soft bodies are enclosed in a shell consisting of two valves or halves. The shells work upon an elastic hinge, and close by a muscle which is very strong. Some of our mussels yield pearls, as the oysters do. They are not so fine as those of the Oriental oysters, but they have long been famous. It was in order to secure British pearls that the Romans first came to England, so the mussels may have played a part in attracting to that country the first civilising influence it ever knew.

THE TRAVELS OF THE BABY MUSSEL ANCHORED BY HOOKS TO A FISH

The pearl mussels live in the rivers, not in the sea. One very interesting feature of their career we must notice. They make their pearls to get rid of the discomfort caused either by an egg remaining in their shell, or by the intrusion of a grain of sand or some other unwelcome body. They do not like parasites, but they themselves are parasites in the early stages of their existence. The young ones, when they leave their mother, have two little hooks attaching to their shell. With these they fasten themselves to the body of the first fish that comes along, and off they go, away from home and parents, out into the world. There they cling and grow until they are big enough to set up house for themselves. Then they sink to the bottom of the water and attach themselves to a rock or something else, and grow into big mussels.

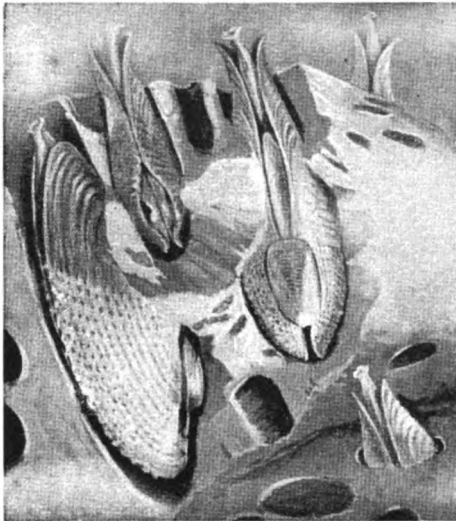
SPINNING SILK IN THE SEA TO MAKE AN ANCHOR FOR THE MUSSEL

In speaking of the oysters and mussels, we say that they, in common with other bivalves, "attach themselves" to the rocks, or whatever it may be. But how can creatures whose outside consists only of hard shell attach themselves to hard, slippery rock, or the hard, slippery shell of some crustacean? The reason is that they spin a sort of silk. "Spin" may be a strange word to use, but that is what it really means. In nothing else is this operation better carried out than in the common sea mussel, which some people eat and fishermen use for bait. The mussel has a foot, like the pholas, and this acts as a sucker, to hold the

LITTLE WONDER - WORKERS OF THE SEA



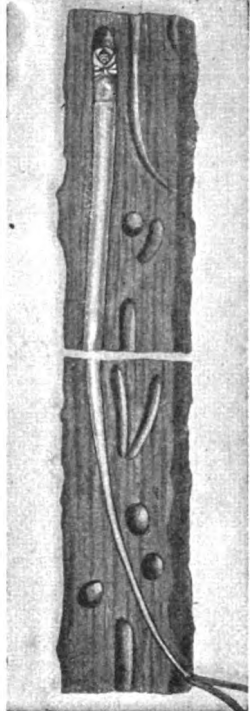
Wherever there is damp sand at the seaside we may expect to see sand-hoppers, the best of scavengers.



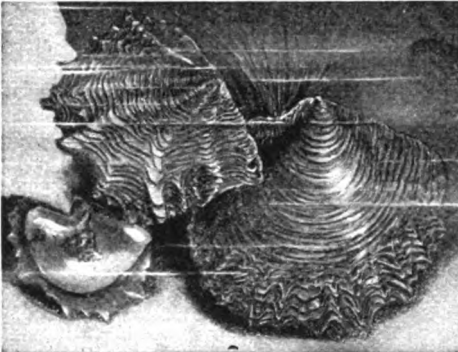
This mollusc can bore its way into rock which would blunt a very strong chisel. It is the pholad, and makes the two halves of its shell its hammer and chisel.



The lug-worm lives in the sand and mud of the shore. It is nearly a foot long.



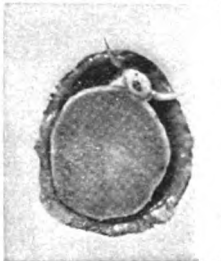
The teredo, which can riddle wooden ships, is seen here in its tunnel.



The oyster shown here is of the sort which, getting sand or some other obstruction into its shell, covers it all over, making it into a lovely pearl.



The common mussel clings to a rock with its sucker-foot, then spins a rope of silk and hangs so fast that even the most powerful waves cannot tear it away.



Limpets cling to rocks, and cannot be dislodged. The sucker-like foot on the right explains the mystery.



The whelk is a deadly enemy of nearly all other shell-fish.



The periwinkle is a good friend to the young oysters.

creature to the rock. But that is only a temporary anchorage.

From the interior of the mussel is spun what we call its byssus. Now, byssus is from a Greek word meaning fine linen or cotton. Strands of this material are put forth by the mussel and woven into a sort of string. This holds to the rock or timber or even smoother surfaces. Mus- sels collect together in great masses, such as we have all seen at the sea- side, and, no matter how the heavy waves beat upon them, they hold their positions in safety. Each mussel spins its own byssus, but it joins its own to that of its fellows. They make all the separate ropes into one strong rope. From this central rope all of them depend.

Engineers know the strength of the mussel's rope. When the break- water at Cherbourg was being built, the French engineers deposited several thousands of mussels upon the loosely piled masses of stone, knowing that these little creatures would bind the whole together with their silk better than any cement made by hands could bind it.

Still more easy to find at the sea- side are the limpets, which cling so firmly to the rocks when the water is out. They do not spin; they merely stick with their sucker- foot, and they can only be pulled off sideways. But a bird of which we have read, the oyster-catcher, manages to dislodge them; and a savage little fish called the bull-rout manages to eat them. When the tide is in, the limpet moves slowly about, eating limy vegetation. Its tongue is a rasping ribbon, containing

sixty rows of file-like teeth, twelve to each row. The limpet's teeth are more numerous than those of the whelk, but those of the latter are by far the stronger. We have seen the eggs of the whelk, on page 1414. Not nearly all the little ones hatched are allowed to grow up, simply because little whelks eat other little whelks. When fully developed the whelk is a terror to other shell-fish. The whelks burrow in the sand and grub about the sea-bottom in search of mussels and oysters. Generally they prefer young oysters, but they attack the old ones quite readily, and do great damage to the fisheries.

A smaller creature, which is often miscalled the whelk, is the in- nocent little periwinkle. If the latter could speak he would protest against being so misjudged, for while the villainous whelk bores his way into the flesh of the young oyster and eats it, the winkle is really one of the young oyster's best friends. The winkle eats sea vegetation, and by so doing prevents the young oysters from being smothered in their beds by the too abundant growth of this weed. Both whelks and winkles are eaten by poor people, and serve also as bait for cod-fishing.

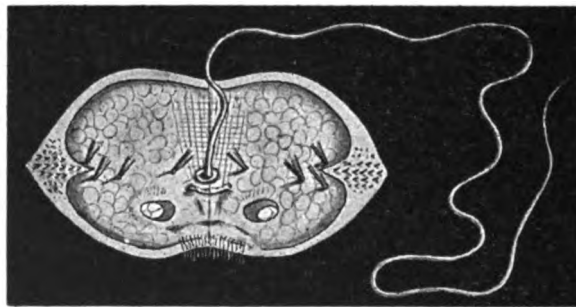
Whelks and periwinkles are not very good things for food, yet many people appear to find

them tasty and pleasant. Mussels are still more generally eaten; but, though they are more easily digested than the others, they are apt to cause harm, because they may prove poisonous.

The next stories of Nature are on 2675.



The mussel has clung to a support and can now defy the waves. His sucker-foot clings to the timber, and he is further secured by the strands of silk which he has spun.



This is a baby mussel. The long streamer catches the first fish it touches. The mussel then grapples this steed and sticks till grown up.



WOMEN WRITERS OF ENGLAND

BEFORE the later years of the eighteenth century there are few, if any, women writers we need read about. But to know even a little about the history of the women writers is to understand a very great change that has taken place in regard to the position of women in our times. From very early times men wrote all sorts of books, but less than a hundred years ago it was still thought that the writing of books was no work for women. The great-grandmother of Maria Edgeworth, one of the famous writers we are to read about, considered that a lady should not be educated beyond the ability to know her Bible, and to make up the weekly accounts of the household. This was little more than a hundred years ago, and the old-fashioned lady who had this opinion only spoke what most of the ladies of her time believed, so that we, living in a day when quite as many books are written by women as by men, can see how greatly times have changed.

It is often said that women cannot rise to the heights achieved by men in the various arts, such as literature, poetry, painting, music. But while this may be true—for there is certainly no woman's name that can be

CONTINUED FROM 2540



ranked with Shakespeare or Milton or Scott — some women have written books which no man has excelled. This cannot exactly be said of the first woman writer with whom we are here concerned; yet the name of Fanny Burney, which, in point of time, must head the procession of brilliant women writers, is likely to remain famous, and her works to be read as long as most of those written by the storytellers we have already heard about. Fanny Burney was born at the town of Lynn, England, June 13, 1752. Her father, a distinguished musician, had gone there as organist and music-teacher because his health was delicate; but he soon afterwards returned to London, where he lived to the ripe old age of eighty-eight, and was the friend of most of the eminent men of his day. The great Dr. Johnson; Sir Joshua Reynolds, the famous artist; Edmund Burke, the celebrated philosopher; and Garrick, the greatest actor of his time, were among the notable visitors at the home of Dr. Charles Burney.

Fanny Burney was just eight years of age when her father returned to London, and a more shy or backward child it would be difficult to imagine.

All her brothers and sisters were bright and promising children, but Fanny gave not the slightest hope that she would ever do anything remarkable. At eight years of age she did not even know her A B C, and so quiet and retiring was she that she was in danger of being neglected altogether, not only by the famous visitors to the house, but by her father and her stepmother.

FANNY BURNEY, "THE LITTLE DUNCE," AND HOW SHE BEGAN TO WRITE

Yet the little girl's very modesty attracted some, and when her stepmother, a most estimable lady, was accused of not paying Fanny sufficient attention, she replied that "she had no fear about Fanny," and refused to waken up "the little dunce" by using the rod, as had been suggested.

Fanny was, indeed, only another proof that it is not always the bright and lively child that grows into a clever man or woman. For had it not been for what this little dunce achieved in later years, the name of Burney, and perhaps even her father's own fame, would have been quite forgotten long ago. As soon as Fanny did learn her letters she became a great reader; and almost as soon as she could read she began to write stories.

At first this was thought mere child-play, and she was allowed to scribble away to her heart's content; but when she was about sixteen or seventeen she had written a vast number of stories, and her stepmother pointing out to her how unladylike it was to think of being a novelist, Fanny one day made a bonfire of all her writings, and resolved to invent no more stories.

A GREAT STORY THAT WAS WRITTEN IN SECRET BY A YOUNG WOMAN

We may be sure the world lost nothing by the bonfire; but among the stories which she burned was one that had so engaged her imagination that, before very long, she found the temptation to weave it over again too strong, and though she still refrained from writing, she composed in her mind the whole of the new story which had grown out of the one she had burned. It would, indeed, have been a pity if she had kept her word to write no more, for then the world would never have read that most charming of her stories, "Evelina."

It was by stealth she wrote it, however, so that neither her father nor her stepmother should know; and although it was not published until she was twenty-three years old, it had probably been finished long before then. So little did she estimate the value of the book, that she sold it to her publisher for \$100; and though it was printed without her name, her father soon guessed that it was the work of his daughter, and realised that his daughter was a genius. "Miss Burney is a real wonder," was Dr. Johnson's opinion of her on reading the book, which is full of a deep and true knowledge of life, such as we should only expect from a person of mature years, and not from a mere girl.

Before long, Fanny Burney was famous; she was the lion of the literary and fashionable world of her time, and her second novel, "Cecilia," published four years later, was also a great success. Becoming known to the royal family, Queen Charlotte appointed her second Keeper of the Robes, a menial post which she soon was glad to give up.

WHAT FANNY BURNEY DID FOR OUR ENGLISH LITERATURE

When she was nearly forty, Fanny Burney married a French general named D'Arblay, who had been driven to England by the Revolution in France. Although her third story, "Camilla," brought her the great sum of \$15,000, it is not so good as her others, and her last novel, "The Wanderer," earned \$7,500 for her, yet it also does not compare with the first two.

Madame D'Arblay, as, of course, Fanny Burney was called after her marriage, did a great service to literature by showing how to write a story that could illustrate both the high and the low life of the day in simple, unaffected language, pure and wholesome in tone, and yet true to life. Her diary and letters fill many volumes, and are almost as famous as her novels, so that we see a "little dunce" may sometimes be only another term for a great genius. Madame D'Arblay died on January 6, 1840.

Not many men have so large a family as twenty-two, but Doctor Charles Burney, the father of Fanny, was his father's twenty-second child, and, curiously enough, Maria Edgeworth, the next famous woman writer, was one of



Fanny Burney



Maria Edgeworth



Jane Austen



Jane Porter



Mary Mitford



Mrs. Gaskell



Charlotte Brontë

twenty-two children. She was born on New Year's Day, 1767, at Black Burton, near Oxford, and although we are apt to look upon her as an Irish woman, because most of her long and useful life was passed in Ireland, she was of pure English descent. She describes herself as "a New Year's gift" to her father, and between the two there was a lifelong affection, as they were almost inseparable throughout life. Her mother died when Maria was a child, and her father married three times afterwards, so that Maria had three stepmothers, with whom she seems to have lived happily.

From her earliest years Maria had a passion for story-telling, but she does not appear to have written so much as Fanny Burney did. Certainly, there is no record of her having to make a bonfire of her childish scribbings. We are told that when she was thirteen she wrote a story called "Generosity," of which her father said: "It is excellent and extremely well written, but where's the generosity?" When she was fifteen, her father settled in Ireland, where he had a beautiful house called Edgeworthstown, and there, with a fine library to roam through, the girl had every encouragement to engage her literary tastes. Her father, a very clever man, helped her with her early writings, though these are the least important of her works. Unlike Fanny Burney's stepmother, Richard Edgeworth recognised his daughter's ability. When she was a young woman of twenty-four, he urged her to write down anecdotes of the children he was educating, and the first book they did together was called "Practical Education."

She wrote many stories and essays, her chief tales being "Castle Rackrent," "The Absentee," and "Ormond," all of which describe life in Ireland in a vivid and truthful way, though they have the fault of being inclined to sermonising. Sir Walter Scott was a great admirer of her works, and, indeed, her sound common-sense was approved by all the great people of her time. Whenever she went to London, she was a centre of literary interest, and although rather a plain woman, all who knew her seemed to have been delighted with her character. In 1823 she made her memorable visit to Sir Walter Scott at Abbotsford, and her long and honourable life came to an end on May 22, 1849. It is worthy of note by those who suppose that, as we grow old, the time for learning has passed, that Maria Edgeworth began to learn the Spanish language when she was eighty-two, only a few months before she died!

Jane Austen was the name of one of the greatest and earliest story-tellers. She was born on December 16, 1775, at Steventon, in Hampshire, where her father was the rector. This quiet



Emily Brontë



Anne Brontë



"George Eliot"



Mrs. Lynn Linton



Charlotte M. Yonge



Mrs. Craik



Mrs. Oliphant

old rectory was her home for twenty-five years, and Jane, being the youngest of a family of seven, all the rest of whom were boys, had the advantage of receiving from her father, who took pupils for instruction, an education as good as any of her brothers.

JANE AUSTEN, THE CLEVER GIRL WHO BECAME A GREAT WRITER

Indeed, Jane Austen was quite exceptionally educated for a woman of the time, and we have to bear in mind that a hundred years ago English people, as a whole, were not so well instructed as they are to-day. Even the wealthy people of the country were very badly educated, and the clergyman was very often the only person of any learning in his village. Jane Austen's father was once addressed by a rich squire to this effect: "You know all about these things. Do tell us. Is Paris in France or France in Paris, for my wife has been disputing with me about it?"

Jane was a great reader; all the best-known writers of English literature were known to her. French and Italian she knew also; but she was by no means a girl who neglected household duties to pore over her books. She seems to have been in every sense a healthy, happy, and also a beautiful country maiden, with a singular gift for telling stories. As soon as she could write, she began practising the making of tales, and later on, when she set herself in real earnest to write long stories which were to be printed and sold everywhere, so easy did she find it to compose her tales that she could go on writing them even with visitors in her room, to whom she would talk from time to time. We see her at her desk in the picture on page 259.

WHAT THE GREAT SIR WALTER SCOTT SAID ABOUT JANE AUSTEN

Her first story was called "Sense and Sensibility," and was one of three fine novels which she wrote at Steventon between the ages of twenty-one and twenty-three, although it was not printed until 1811, when she was thirty-six. The other two were "Northanger Abbey" and "Pride and Prejudice." The last, together with two other fine stories—"Mansfield Park" and "Emma"—were published during her lifetime, but "Northanger Abbey" and "Persuasion," which complete the list of her books, were not printed

until after her death, July 18, 1817. Her name had never been given on her novels that were published while she was still alive, so that she enjoyed but little of the great fame she might have won in her lifetime; but her name will live as that of one of the greatest novelists, for no one has excelled her in describing the quiet country life and the character of country people in England a hundred years ago. Sir Walter Scott read "Pride and Prejudice" three times with great delight, and said of Jane Austen: "The big bow-wow I can do myself like anyone going, but the exquisite touch which renders commonplace things and characters interesting, from the truth of the description and the sentiment, is denied to me. What a pity so gifted a creature died so early!"

Women were now venturing more and more to come forward as story-writers, and instead of it being thought a disgrace for a young lady to write a romance, as in the days of Fanny Burney, people were perhaps too ready to see merit in a story that had been written by a young woman.

JANE PORTER, WHO WROTE THE STORY OF "THE SCOTTISH CHIEFS"

Perhaps that was why Jane Porter, who was born at Durham in 1776, could have become famous in 1803 by writing a very high-flown romance entitled "Thaddeus of Warsaw." It is certain that such a book would not attract any readers to-day, and when we look into it, it is very difficult to believe that many thousands were delighted by it a century ago, the Grand Duke of Würtemberg even conferring a distinction on its author by making her a canoness of the order of St. Joachim! Just as fashions change, so does the taste for reading, and our great-great-grandparents, being simpler-minded than we are to-day, perhaps would be easier to please. But Jane Porter also wrote another book entitled "The Scottish Chiefs," which has often been reprinted, although its hero, Sir William Wallace, cuts a very absurd figure when compared with any of the scores of splendid historical characters that appeared in Scott's novels.

Jane Porter was really a celebrated novelist years before Scott wrote "Waverley," and the fact that people immediately turned with delight to

the grand stories of Scott shows that they only read Jane Porter's for lack of better ones. Her sister, Anna Maria, also wrote a great many novels, and her first book, entitled "Artless Tales," was published when she was only thirteen; but she does not rank among the women writers of note, and Jane Porter herself, who died May 24, 1850, is chiefly interesting because of the fame which she won in her own day, and not because of any enduring merit in her stories.

Mary Mitford, the daughter of a spendthrift physician, was born at Alresford, in Hampshire, on December 16, 1787, and began her literary life by

was brought up by an aunt at the charming old-fashioned town of Knutsford, in Cheshire, which she was, later on, to make famous by describing it as "Cranford," in her novel of that name. We are told that she was noted as a girl for her sweet disposition as much as for her beauty, and at twenty-two she married a minister, and went to live in Manchester, where the rest of her life, so busy and useful, was spent.

Mrs. Gaskell was thirty-eight when she published her first novel, "Mary Barton," so that, unlike most of the other story-tellers about whom we have been reading, she did not write of



FANNY BURNEY DESTROYING THE MANUSCRIPTS OF HER EARLIEST STORIES

publishing a book of poems when she was twenty-three. She wrote plays for the stage and many charming sketches of country life. The best of her writings are gathered into the book called "Our Village." When Mary was ten her father bought her a lottery ticket which won \$100,000; but he managed to squander the money, and Mary had to write for her living. She died in January, 1855.

Mrs. Gaskell, whose maiden name was Elizabeth Cleghorn Stevenson, was really the first notable woman writer born in the nineteenth century, her birth having taken place on September 29, 1810, at Cheyne Row, Chelsea, a place that is famous in literary history. Elizabeth

men and women until she had studied them thoroughly, and what she wrote of them was not so much from her imagination as from her observation.

Many other stories she wrote, all full of quiet charm, and true pictures of English life, but she is also famous for having written one of the best biographies we possess, in "The Life of Charlotte Brontë," about whom we are presently to hear. This was a very difficult task, and Mrs. Gaskell fulfilled it admirably; but, unfortunately, she was so disappointed by the complaints of different people then alive, who disapproved of it for personal reasons, that she determined no biography of

herself should ever be written, and left strict instructions to this effect when she died at Alton, on November 12, 1865.

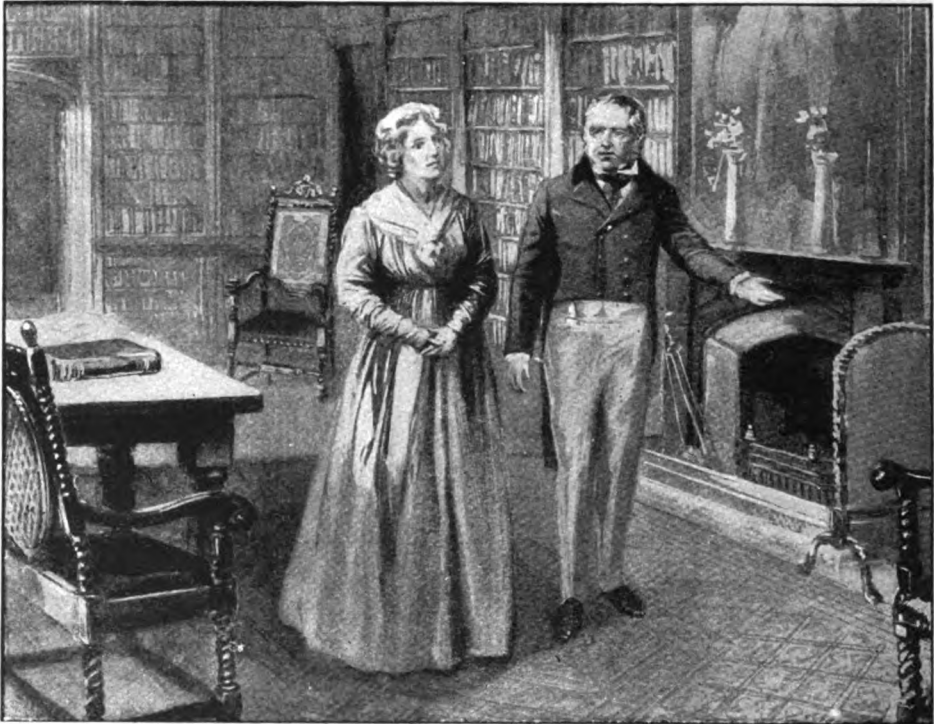
The next woman story-writer of note who was born after Mrs. Gaskell bore a name in later life which is familiar all over the English-speaking world, and yet she was not a great writer at all. Her maiden name was Ellen Price, and she was born at Worcester, on January 17, 1814. All her life she was of delicate health, and as a girl she does not appear to have been particularly fond of writing stories, giving no sign that she might ever become a popular author. She married a ship-agent named Henry Wood, and went to live in France; but her husband died while he was still a young man, so that Mrs. Henry Wood, after she settled in London, thought of occupying herself by writing.

She was forty-six years of age before her first book was published, and it is interesting for boys and girls to know that this book, of which hundreds of thousands have been circulated, was written by her for a prize offered by a temperance society. The story is called "Danesbury House," and the year after it appeared Mrs.

Wood wrote another story, which immediately became the most widely-read book of the day. This was "East Lynne," an improbable and needlessly tearful story; but as a great many people seem to enjoy having their feelings harrowed by improbable stories of suffering and woe, "East Lynne" has had an enormous popularity for nearly half a century, both as a story and as a play; yet neither it, nor any of the many books which Mrs. Wood afterwards wrote, can be described as real literature. Mrs. Wood died in London, on February 10, 1887.

THE THREE BRONTË SISTERS WHO WROTE SEVERAL FAMOUS BOOKS

We come now to three sisters whose names are among the most famous in the story of English literature in the nineteenth century. They have all been dead for more than half a century, and none of them enjoyed long life. Indeed, the idea that great activity of the mind often goes with frailty of the body, and may sometimes be the result of the latter, has some support in the lives of the three sisters Brontë. The eldest, Charlotte, was born at Thornton, in Yorkshire, on April 21, 1816, and died



MARIA EDGEWORTH VISITING SIR WALTER SCOTT AT HIS HOME AT ABBOTSFORD



THE BRONTË SISTERS WRITING THEIR FAMOUS STORIES IN THE RECTORY AT HAWORTH at Haworth, a village on the Yorkshire moors, on March 31, 1855. Emily lived from August 20, 1818, till December 19, 1848; and Anne, from March 25, 1820, till May 28, 1849. It will be seen from those dates how short were the lives of these three most remarkable women; but, short as their lives were, their names will ever be famous for the work they contrived to do, despite the sorrow and hardship it was their fate to endure.

WHAT SORROW AND TROUBLE CAN DO FOR LITERATURE

Some of the finest works of literature have been the outcome of sorrowful hearts, and perhaps unhappiness has really done more in urging men and women to enlighten their fellow-men than happiness has done. Possibly, had these three women lived happy and comfortable lives in the West End of London; strong in health and well supplied with money, the world would never have heard of them, and we should never have had Charlotte's great stories, "*Jane Eyre*," "*Shirley*," and "*Villette*," or Emily's wonderful romance of "*Wuthering Heights*," or Anne's story of "*Agnes Grey*," though the last is by no means so great a book as the others mentioned. It was

because the three motherless girls, whose father was a gloomy and reserved pastor of a moorland village, with insufficient means to provide them with comforts, while the people around them were chiefly of a rough and common class, were driven into their own companionship, studying and sorrowing together, that they wrote so well.

All were frail of body, for the seeds of consumption, which had carried off two other sisters in childhood, were in each of them, and were very soon to take the three sisters in swift succession to their graves. All their knowledge of the world was obtained from a few short years at boarding-schools of the period, which were none too well conducted, but Charlotte and Emily had two years at school in Brussels, the capital of Belgium, the story of which is largely told in "*Villette*." Their highest ambition in those days was to become governesses, for which their gentle and sensitive natures by no means fitted them; but their first effort in the way of literature was a little volume of poems, published in 1846, which attracted very little attention.

Each of the sisters took the name of "*Bell*," Charlotte calling herself

"Curren Bell," Emily "Ellis Bell," and Anne "Acton Bell," and when they next tried to win success by writing prose stories they kept those names, so that, a year later, when Charlotte's romance of "Jane Eyre" won a great success, many people believed it to be written by a man, although it is difficult to imagine why anyone who has read it could think a man would have been able so wonderfully to express the mind and character of a young woman.

THE END OF THE SAD STORY OF THE THREE BRONTË SISTERS

The fame which came to Charlotte and her sisters was very soon to be shadowed by death, for Emily passed away the year after "Jane Eyre" was published, and Anne followed her to the grave in five months' time. The hand of Death was on the lonely vicarage, and the only brother had died three months before the death of Emily, so that Charlotte was now alone with her aged and gloomy father. The literary world would have made much of her, but her life was too much overcast with sorrow to enjoy all the fruits of the success which her pen had won, and to go on writing was all that remained to her. Her last days were a brief happiness as the wife of her father's curate, Rev. A. B. Nicholls, whom she had married less than a year before her death.

When the Brontës were little children away on the Yorkshire moors, another little girl, whose name was Marian Evans, was playing about the farmhouse of Griff, near the town of Nuneaton, amid the sunny fields of leafy Warwickshire. She had been born on November 22, 1819, at Arbury Farm, where her father, who was the land-agent on the beautiful estate of Arbury Hall, was then living.

THE SCHOOLDAYS OF THE GIRL WHO WON FAME AS "GEORGE ELIOT"

Marian went to school at Nuneaton in a plain little schoolhouse which still stands beneath the shadow of the old parish church, but later she was at a boarding-school in the historic town of Coventry, and there, as a girl in her "teens," the preaching of some evangelist made a great impression on her, so that she began, while still young, to think seriously of life. She had a great love for her mother, who died when Marian was seventeen; her elder sister passing

away a year later, Marian became the housewife of Griff Farm at eighteen.

But she was no ordinary mistress of a farm, for she had teachers of German, Italian, and music, who came over regularly from Coventry to give her lessons in these subjects, so that she became an accomplished scholar in languages, and was always a passionate musician. The long leisure of country life was also a boon to her, for she was a great reader, and there can have been few women of her age so widely read as Marian Evans. When she was twenty-two she went to stay with her father at Coventry, and there she began her first literary work, translating from the German a famous "Life of Jesus." She stayed at Coventry until the death of her father, in 1849, when she travelled abroad for some time, and in 1850 settled in London as a writer and translator.

GEORGE ELIOT'S FIRST STORY AND HER OTHER FAMOUS BOOKS

So far she had done nothing that would have made her famous; but she had rather the mind of a man than of a woman, and her bold and courageous views of life soon made her the centre of a literary circle in the great city, or, indeed, wherever she went. She was thirty-seven when she attempted her first story, "The Sad Fortunes of the Rev. Amos Barton," which was published in "Blackwood's Magazine." This was one of the stories afterwards published as "Scenes of Clerical Life," in which, with the most remarkable genius, she made use of many living characters in and about Nuneaton.

All who had taste for good literature realised at once that a new writer of great power had arisen, and as she now signed herself by the name of "George Eliot," anyone might have been excused for thinking that the stories were the work of a man, so strong and true was the grasp of character, so deep the insight into human nature. No English woman had ever before and none since has shown such power. Her most famous book, "Adam Bede," was published when she was forty, and she wrote many others before she died at Chelsea, on December 22, 1880. Some of these at least, such as "The Mill on the Floss," "Silas Marner," and "Romola," rank among the greatest of English novels. It may be said of George Eliot

that she enlarged the scope of the English novel, and proved to the world that a story can be at once a source of pleasure and entertainment, and yet full of the wisdom of life and a great help to the understanding of human nature.

All the other women writers of the nineteenth century that call for notice here are far below the Brontës and George Eliot in their gifts of mind and their literary power. Mrs. Lynn Linton, who was born on February 10, 1822, and died on July 14, 1898, enjoyed a long and useful life, during which she wrote an immense number of stories and essays. She was a lady of great personal charm, and in every way the model of a self-reliant, courageous woman of the old-fashioned type, but her stories are not likely to engage the readers of a later generation. Mrs. Linton knew George Eliot, and among the last of her writings were some reminiscences of that famous woman.

MISS YONGE'S STORY "THE DAISY CHAIN," AND HOW IT BUILT A COLLEGE

Miss Charlotte M. Yonge was a story-writer of much the same standing as Mrs. Linton. She is famous for her story "The Heir of Redclyffe" and her book of Golden Deeds, and she wrote altogether some 120 volumes of fiction, most of which were extremely successful. She was greatly devoted to missionary work, and part of the profits of the story just mentioned were devoted to fitting out a missionary schooner for cruising in the South Seas. Another of her books, "The Daisy Chain," brought \$10,000, and this large sum of money she gave to build a missionary college in New Zealand. Miss Yonge was born on August 11, 1823, and died on March 24, 1901.

A more notable writer than either of the last two named was Dinah Maria Mulock, author of "John Halifax, Gentleman," who was born at Stoke-upon-Trent, on April 20, 1826. This lady came to London and wrote a number of successful stories before she was thirty years of age; but "John Halifax" is her most notable achievement, and few novels of the nineteenth century have been more widely read. She also wrote many poems worthy of remark, and was a clever essayist, but she will always be remembered as the creator

of John Halifax. Some twenty years before her death, which took place on October 12, 1887, she married Mr. Craik, and she is more often spoken of as Mrs. Craik than under her maiden name.

A BRAVE SCOTSWOMAN WHO KEPT HER FAMILY BY HER WRITINGS

Another delightful woman story-writer, who resembled in many ways Mrs. Lynn Linton, was Mrs. Oliphant. Although she does not rank with the highest, she wrote many stories of much charm, and a number of fine books of an historical character. The story of her own life would be quite as interesting as any in a novel, for she was a brave and good woman who, after her husband's death, had to take up her pen and earn a livelihood for her children. How much she had to fight against we can guess, from these words written by herself: "When I thus began the world anew I had for all my fortune about £1,000 of debt, a small insurance of, I think, £200 on Frank's life, our furniture laid up in a warehouse, and my own faculties, such as they were, to make our living and pay off our burdens by." But with the courage of her hardy Scottish ancestors—she was born near Musselburgh, in 1828—she set herself to the task, and, often struggling with a heavy heart on account of the illnesses of her children, she plied her pen at story-telling and in writing for the journals. Mrs. Oliphant died at Wimbledon, June 25, 1897.

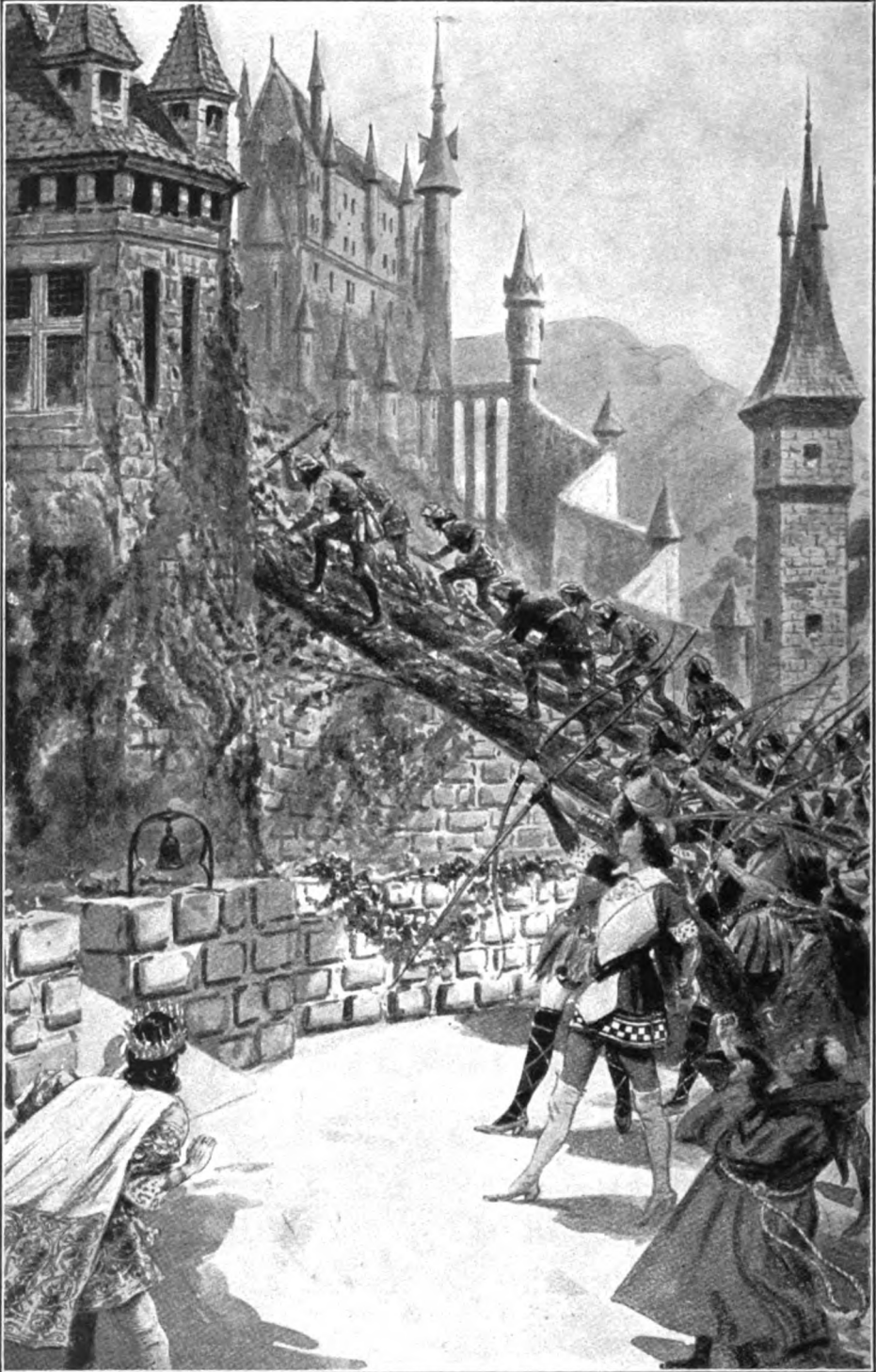
THE REAL NAME OUT OF WHICH "EDNA LYALL" WAS MADE

Only one more writer of note need be mentioned here. Edna Lyall, who was born at Brighton, in 1859, and died at Eastbourne, on February 8, 1903, was a woman novelist of real power and sincerity, whose many books, which were widely read and are still popular, must have done much good. Her real name was Ada Ellen Bayley, and that she wrote under was made from it.

Of course, there were many other women story-tellers whose books were popular, more or less, and there are many others still alive who enjoy fame as great as some of those of whom we have read here; but those we have chosen may fairly be described as the most noteworthy of the English women writers up to the end of last century.

The photos of Mrs. Linton and Miss Yonge on page 2593 are by Elliott & Fry; those of Mrs. Craik and Mrs. Oliphant by Mendelssohn.
THE NEXT STORIES OF MEN AND WOMEN BEGIN ON PAGE 2701

ROBIN HOOD AND HIS MEN STORM A CASTLE



Wonderfully courageous were the merry men of the greenwood under their valiant leader, the outlaw Robin Hood. Here we see them attacking a castle, effecting an entrance over some tree-trunks thrown across the moat.



Robin Hood's charity



Robin Hood as a potter



Robin Hood as a beggar

ROBIN HOOD AND HIS MERRY MEN

ONE day, when Richard Cœur de Lion was King of England, there walked in the beautiful green forest of Sherwood a handsome youth and a beautiful maid who were lovers plighted to be wed. The youth was Robert, son of the Earl of Huntingdon; the maid was Marian, daughter of the Earl of Fitzwalter. They both loved the greenwood; they both shot exceedingly well with the bow; and the maid was as swift to mount and ride a horse even as was the handsome youth at her side. As they walked hand in hand down the green glades of the forest, Robert spoke of the merry days that lay ahead of them, and Marian laughed to think of the great joy that was coming to her. They were happy lovers, a boy and a girl who thought of life as a delightful summer ballad.

But a little thing happened. The King was in Palestine, and his wretched brother, John Lackland, ruled the kingdom. To get money and curry favour with the Normans, this miserable man made war upon the rich English nobles, and among those whom he destroyed and ruined was the Earl of Huntingdon. Poor, brave, happy Robert saw in a single day his father killed, his home destroyed, his estates

seized, and himself made a homeless and beggared outlaw.

He escaped from the soldiers of John, and, plunging into the thick forest of Sherwood, with his bow, threw himself down upon the green earth and wept for the ruin that had so suddenly overtaken him.

When morning was come, he took counsel with himself and planned how he should live his life. The night in the open air had been sweet to him; the sunrise breaking and glittering through the fragrant branches had roused him in the first flush of dawn; he drew the scented cool air into his lungs, felt the glory of the daybreak caress him, and saw that the greenwood was a fair world.

"Since John has made an outlaw of me," he said, "I will take this good forest for my estate, and feed upon the King's venison, and call myself Robin of Sherwood."

He wrote a sad letter to Maid Marian telling her of all his misfortunes, and setting her free of her vow, since he could not ask a great lady to share his outlaw's life in the forest. It cost him many a sigh to send this letter, but his loneliness in the greenwood, which made it so hard for him to give up his lady-love, was soon broken by a delightful interruption.

CONTINUED FROM 2494

Brave men who had served his father, the Earl, came into the forest with their bows and arrows and swore that they would spend their days with Robin. They refused to live under the Normans; they would be outlaws, they said—free, merry men of the greenwood, and Robin should be their king. And they lived in the forest near Nottingham, which Robin sometimes visited disguised as a beggar or tradesman.

Thus it happened that Robin became the chief of a band of stout English, who feared no danger, courted adventure like a maid, and loved a jest. This company soon arranged how they should live. In those days, when roads were hard to find, people travelled on horseback, and many a plump abbot and covetous merchant went by the forest with their saddle-bags stuffed with gold. Robin declared that he saw no wrong in relieving these people of their baggage, since they only lived to rob the poor; he would treat them with kindness, he said, but he would help himself to their money. Disguised as a friar one day, for instance, he despoiled two fat monks of their money-bags, and kept them on their knees praying for over two hours. As for the poor and needy, no man of his must lay a finger upon them; nay, out of the spoil wrung from the rich they must help these poor and make them glad and happy.

Once Robin played an amusing trick on a tinker who said he had the King's warrant to arrest the famous outlaw. Robin told him he would find him in Nottingham, and offered to help him. When they came to the town he gave him so much ale that he fell asleep, and Robin walked off and left the tinker to pay the bill.

In this way Robin lived cheerfully. His fame spread through all the country. People whom he stopped and robbed told strange stories of how they had been carried far into the forest, treated

to a feast worthy of a king, used with all courtesy and kindness, and after having "paid for the entertainment" had been pleasantly led forth and set upon their road again.

They told how Robin had dressed all his men in suits of Lincoln green; and how these cheerful fellows sang the old English ballads, and made great sport with the bow; and how there was one of their members seven feet in height called Little John, another very small and squat man named Much, and a jovial, fat priest of the Church named Friar Tuck, and how Robert was called not Robin of Sherwood, but Robin Hood, and was like a king among his merry men. No wonder that, as these stories spread about the world, the

Sheriff of Nottingham felt that he must catch Master Robin and hang him for a rascally outlaw not fit to live.

The outlaws, however, ran great risks, and Little John even became a servant in the house of the Sheriff himself, where he played several tricks on a greedy old butler, finally knocking him over and running off to the forest with the silver plate of the Sheriff. Some time after the outlaws ventured into the town again to compete in an archery

contest held by the Sheriff for a silver arrow. Robin won the prize, but the Sheriff tried to arrest him, and in the strife that ensued Little John was wounded, and the outlaws only with great difficulty got away, little Much bearing big Little John for some distance on his back.

As Robin rode through the forest one day he came upon a young knight, and challenged him. They fought together and Robin wounded the knight. He went to kneel at his side, and the poor youth removed the helmet on his head, and lo! it was Maid Marian. Robin could first have cried with grief for having wounded her; but when he saw that the wound was not deep, and learned that Marian had come disguised in



"You shall be sworn," said bold Robin Hood,
"Upon this holy grass,
That you will never tell lies again,
Which way soever you pass."

search of her lover, he was glad, and embraced her most tenderly, and led her back to the Trysting Tree. Here he blew upon his horn, his men came from every part of the forest, and when they had heard the story they offered obedience to Maid Marian as their queen, and the jolly old Friar Tuck came rolling up with his book under his arm and married Robin to Maid Marian there in the glades of the forest.

One day Robin stopped an unhappy youth named Allan-a-Dale, and learned that, after waiting long for the beautiful woman who loved him, her wretched, miserly old father had promised her in marriage to an ancient, hideous, but rich man, old enough to be her grandfather. The marriage was to take place on the morrow, and poor Allan-a-Dale was broken-hearted. Robin bade him cheer up, and on the morrow he set off for the church, with his merry men following behind, and in the midst of the ceremony stopped the Bishop of Hereford, who was reading the service, and, blowing upon his horn, summoned all his merry men, with Allan-a-Dale and Friar Tuck in their midst.

"This bridegroom is too old," said Robin Hood; then, addressing the bride, "Lady," said he, "look round and see if you cannot find one more to your choice."

She chose Allan-a-Dale, and Friar Tuck married them then and there.

On another occasion he exchanged clothes with a potter, and took his cart-load of pots and sold them in the market place at Nottingham; and on yet

another occasion he stopped a butcher who was riding with panniers of meat into the market, and, changing clothes with him, set out for the very town where lived the Sheriff who had sworn to lay

him by the heels. The streets were crowded, and Robin amazed everybody by selling his best beef at only twopence a pound. The Sheriff heard of this strange young butcher and his doings, and at the market feast had him to sit at his side.

"I shall get money out of such a simpleton," thought the Sheriff, who was a miser. Robin could scarcely help laughing to find himself sitting in the place of honour

beside his great enemy. The Sheriff asked if Robin had a big farm.

"Hundreds of acres," answered Robin, smiling to himself.

"And much cattle?"

"Hundreds and hundreds of the finest horned cattle."

"Do not speak so loud," mumbled the cunning old Sheriff; "but tell me, how much would you take for your acres and cattle!"

"Three hundred pounds," said Robin.

The Sheriff arranged to ride out very early next morning with this very silly young butcher. They rode on till they approached Sherwood Forest.

"A bad man lives here," said the Sheriff. "Do you think we shall meet him? Robin Hood is his name."

"Oh, I am sure we shall not!" answered Robin, laughing.

Just then a hundred head of good fat deer passed in front of them.

"There go my horned cattle," laughed Robin. "What do you think of them? Are they not good?"



He gave the butler such a rap
His back nigh went in two,
Though he lived an hundred winters
The worse for it he would go.



So while the tinker fell asleep,
Robin made haste away,
And left the tinker in the lurch,
For the great shot to pay.



The butcher he answer'd jolly Robin,
 "No matter where I dwell;
 For a butcher I am, and to Nottingham
 I am going, my flesh to sell."



Up he took him on his back,
 And bare him well a mile,
 Many a time he laid him down,
 And shot another while.



One of his best arrows under his belt
 At the friar he let fly;
 The curial friar, with his steel buckler,
 Did put that arrow by.

The Sheriff rode back to Nottingham late that night with no farm, no horned cattle, and without the £300 (\$1,500) which he had brought with him for their purchase from the simple butcher.

Another of Robin's enemies was the Bishop of Hereford, who had never forgiven Robin the matter of Allan-a-Dale's marriage. He came riding into Sherwood Forest one bright summer day with a company of soldiers carrying money to a distant monastery. He hoped to capture Robin on his way, and carry him prisoner to the Sheriff of Nottingham. As luck would have it, Robin was straying lonely about the forest that day, listening to the blackbirds and thrushes, and enjoying the sweet scents of briar rose, honeysuckle, and bracken.

Before he knew it, the Bishop's soldiers saw him, and charged down upon him. Robin took to his heels. He dodged behind trees, crept along ditches, and ran down the narrowest glades. The horses of the soldiers tripped and stumbled, throwing their riders to the ground. Robin ran hard till he reached the cottage of a poor woman. He changed clothes with her, and promised that if she remained still, and let the Bishop capture her, no harm of any kind whatever should befall her.

As soon as she knew that she could serve good Robin Hood, and do a bad turn to the wicked Bishop, who oppressed the poor, the old woman was glad. So Robin hobbled away, and the soldiers took no notice of him; but they went to the cottage, captured the dame, in Robin's Lincoln green, and bore her off with them. Not very far had they gone, however, before Robin stood in their way with all his bowmen on every side of them. The soldiers laid down their arms, and the Bishop had to deliver up all his treasure.

"It belongs to the Monastery of St. Mary," said the Bishop.

"Nay," answered Robin; "it belongs to the poor, from whom you have filched it, and to whom it shall now return."

Then he made the Bishop celebrate High Mass; and all his men praised God among the trees in the forest.

On one occasion Robin lent a poor knight a sum of £400 (\$2,000) wherewith to pay a selfish abbot who had lent it him. The knight arrived at the abbey only just in time, and found the abbot laughing and eating heartily in company with a justice of the peace whom he had invited to dine with him and arrange for the transfer of the poor knight's broad acres to the abbey.

The knight, to his great disgust, paid up the four hundred pounds, upbraided the abbot for his greed, and rode away home, blessing the kindness of Robin Hood.

A stout and long encounter, too, had Robin with giant Friar Christopher, of Fountains Abbey. He shot all his arrows at him, but the friar stopped them all with his shield, and they then fought hard with swords until they became great friends, and the friar went off with Robin Hood and his merry men into the greenwood.

Such stories as these came to the ear of King Richard when he returned from the Holy Land, and he determined to see Robin Hood. But though he rode many times in Sherwood Forest he saw nothing of Robin or his merry men. He was then advised to put on the dress of a monk, and so disguised he travelled through the forest, and Robin seized him, though the King gave him a blow that sent him sprawling on the ground first. The King was treated fairly, and given a feast, and in the midst of it he showed his ring to Robin, and said that, though a monk, he was a messenger of the King. At the name Robin and all his men stood up, uncovered, and cried with one voice: "God save King Richard!"

The King then disclosed himself, and Robin knelt and kissed his hand. So pleased was the King with this loyalty, and so struck was he by Robin's goodness, that he gave him a free pardon. Robin and his merry men followed the King to London, and there they feasted and had great cheer.

But when Richard died, and John succeeded to the throne, Robin and his merry men had to fly once more to the forest. They were not very sorry, for they loved the wild life of the greenwood, and they were not afraid of John while they had the familiar forest for a kingdom of their own.

The years passed, and Robin grew very ill, and when he watched the young men shoot he grew very sad at heart. He said he thought he would go and visit his relative, the Princess of Kirkley Abbey, in Yorkshire. Little John, very grieved at his master's sickness, bore him thither. He wanted to be near his master and nurse him; but the Princess would not hear of this, and bade him wait in the abbey garden. Then she made a wound in Robin's arm to bleed him, but, instead of tightly bandaging the wound, this woman, who, in her wicked heart, hated Robin for his robberies of monks and priors, loosely knotted the linen, and went out, locking the door behind her. So Robin lay alone bleeding to death, and the faithful Little John stayed in



He took him to a board anon,
To a table round,
And then he shook out of a bag
Even four hundred pound.



And such a buffet he gave Robin,
To ground he went full near;
"I do avow to Heaven," said Robin,
"Thou art a stalwart frere."



Robin saw some young men shoot,
Full fair upon a day,
"Alas, alas!" said good Robin,
"My joy is gone away."

the garden of the abbey gazing up at his beloved master's window.

Twilight fell upon the garden. Presently three soft notes sounded faintly upon Robin's horn.

"He must be dying to blow so weakly!" cried Little John, and started up. He ran up the stairs, reached the door, burst it open, and rushed in to embrace his master.

"I am dying," said Robin, and swooned in his arms.

After a moment he roused himself. "Give me my good bow and an arrow," he said. He took the bow, and went to the window. "I will shoot once more," he said, "and where the arrow falls, there let me be buried."

He was so weak that the arrow fell but a little way into the ground.

"A good shot! A good shot!" cried Little John, with his eyes full of tears.

A PAIR OF MAGIC SLIPPERS

IN the old coaching days, when everybody travelled by road, the innkeepers were a race of busy men. Certainly, Sandro Reni, who kept an inn on the highway between Siena and Florence, was the busiest man in Italy. His inn was always crowded with travellers, and all the work fell on his shoulders. His wife died, leaving him a little daughter named Nina; and as he then found that he could not get on without a helpmate, Sandro married another woman. Little help, however, did he get from her. She was a very beautiful creature, but she was as idle and as vain as she was beautiful. And, unhappily, the fame of her great beauty spread far and wide, and this made her still idler and vainer. Whenever travellers came to the inn, she used to show herself off, and say:

"Now, have you ever seen anybody more beautiful than I am?"

At first they replied that they had not; but at last, as Nina grew up, and became also very lovely, they said:

"Well, your little stepdaughter, you know, is really a very charming girl."

By this time, however, the woman's head had been turned by all the admiration she had obtained, and she could not bear to hear anyone else praised but herself. It made her mad with jealousy. She looked with spiteful and angry eyes at Nina, and said to herself:

"Was it a good shot?" demanded Robin eagerly. "Really a good shot?"

"'Twas a good shot, master."

Then Robin said:

Lay me a green sod under my head,
And another at my feet,
And lay my bent bow by my side,
Which was my music sweet;
And make my grave of gravel and green,
Which is most right and meet.

Let me have length and breadth enough,
With a green sod at my head,
That they may say when I am dead,
Here lies bold Robin Hood.

As he lay swooning in the arms of Little John, he suddenly roused himself, and looked earnestly forth from the priory window towards the gathering darkness of the night.

"Was it," he whispered hoarsely, straining his eyes, while his heart rattled and shook his frame, and his soul passed away—"was it a good shot?"

"If I do not get that child out of the way, I shall lose all my fame."

She had received a great many jewels from her admirers, and she now sold half of these, and gave all the money to two wicked and desperate men, and told them to take Nina to a distant forest and kill her, and bury her there. The two men carried Nina to the forest; but they were so touched by her innocence and beauty that they had not the heart to shed her blood, so they tied her to a tree and left her to starve.

There Nina remained for five days and four nights, but on the fifth night, just as all her strength had failed, a band of robbers gathered beneath the tree to share their spoils.

"Oh, heavens!" cried the captain of the robbers, as the light of their fire fell upon the white dress of Nina.

"An angel is watching us!"

The robbers fell upon their faces in terror. Then, finding that the white figure did not move, the captain crept slowly up, and touched it.

"Why, it is a beautiful girl," he said. "Quick, cut the ropes! She is dying!"

The robbers took Nina to their cave, and kindly tended her, and when she recovered she told them her story.

"Well," said the captain of the robbers, "it strikes me that it would be unwise for you to return home. Your stepmother would find some other

way to kill you. Stay with us, and be our little housekeeper."

And this was what Nina did. She kept house for the robbers in the cave, and prepared their meals for them. In return they treated her as a little sister, and whenever they went to sell their spoils at Florence or Siena, they brought her jewels and fine dresses. One day they stopped at Sandro Reni's inn, and his wife saw one of the dresses.

"Who is that for?" she said.

"For someone more beautiful than you," said the captain of the robbers.

The stepmother at once guessed who it was. She sold the other half of her jewels, and gave all the money to a witch, and got a pair of satin slippers from her. And the next time the captain of the robbers came, she said to him:

"Here's a pretty present for the pretty girl you spoke of."

The captain of the robbers took the slippers to Nina, and in the afternoon, when Nina was alone, she put them on. When the robbers came home at night, they found their little sister lying dead on the floor of the cave, and they could not understand how she had come by her death.

"Oh, how beautiful she is!" said the captain of the robbers. "Let us make the cave into her tomb, and array her like a princess."

The robbers made a couch in the middle of the cave, and placed Nina upon it, and dressed her in her jewels and fine dresses, and they all went sadly away, and dwelt in another part of the forest.

Finding that the place was no longer infested with robbers, huntsmen in search of wild game began to come there, and one day the young Duke of Tuscany started a boar, which ran into the cave.

"Now I have the beast," said he.

He alighted from his horse, and entered the cave, and found Nina lying on the couch.

"Oh, what a miracle of beauty!" he exclaimed. "Surely she lives!"

But though he tried all manner of ways of bringing her back to life, she never moved, and at last, as night was falling, he prepared to leave.

"But I must have a keepsake," he said to himself.

He pulled off one of the satin slippers. Then, seeing in amazement that one of



Nina opened her eyes and rose up, and the young duke clasped her in great joy.

the eyes of the girl had opened, he pulled off the other slipper, and the other eye opened, and Nina rose up. The young duke clasped her in great joy, and led her out of the cave, and seated her upon his horse, and conducted her to his palace.

After hearing her story, he had the stepmother and the witch and the two wicked men punished. But he pardoned the robbers, and took them into his service; and when the splendid wedding of the young duke and the lovely Nina took place, Sandro Reni gave up the busy trade of innkeeping, and became quite an important man in that country as father of the duchess.

THE FAIRIES OF ST. DAVID

A LONG time ago, Elidorus, a boy of twelve years of age, was punished by his schoolmaster, and he ran away and hid in a cave by the river, and there he remained without food for two days. Two wee men then appeared, and said :

"Follow us, and we will take you to the Land of Delight."

And Elidorus followed them through a dark passage down the earth, out into a rich and beautiful country. But there was no sun or moon or star there, only a strange twilight falling from a strange sky. The two wee men led Elidorus to their King, and their King made Elidorus the companion to his eldest son. All the people of the Twilight Land were very small, but they were very handsome, and they had long

golden hair that fell over their shoulders. The King of the Twilight Land allowed Elidorus to go back through the dark passage and visit his mother, and one day Elidorus was telling her what a rich country he lived in, and she bade him bring her some of its treasures.

So, the next time Elidorus played with the son of the King, he stole a golden ball and ran with it to his mother's house. The two wee men, however, pursued him, and they tripped him up just as he got indoors, seized the golden ball from his hand, and departed.

Elidorus was very sorry that he had stolen the golden ball, and he wanted to beg the King's pardon, but the passage in the cave by the riverside was closed, and was never opened again to Elidorus.

THE LORD OF THE LIONS

SOME time ago a settler in Uganda brought with him a donkey, and one morning the donkey ran away into the open country. There he brayed so long and loudly that he roused a lion. The lion sprang up, and then stood still in astonishment. Was it safe to attack this strange, new animal with long ears?

"Who are you?" he said.

"The Lord of the Lions," said the donkey. "Didn't you hear my challenge?"

"Yes," said the lion. "But we need not fight. Let us enter into a league against all other animals."

So the two of them set out together, and they came to a river. The lion cleared it at a leap, but the donkey swam through it very badly.

"Why, you can't even swim!" said the lion.

"Swim?" said the donkey. "I swim like a duck. Didn't you see I caught an enormous fish with my tail, that nearly pulled me under? But you were so impatient that I let it go."

Soon afterwards they came to a wall. The lion jumped over, but the donkey got his fore feet across and couldn't get any further.

"What are you doing now?" said the lion.

"Can't you see?" said the donkey. "I'm weighing myself. I want to find out if the fore part of my body is as heavy as the hind part."

After a wild struggle the donkey got over, and the lion said :

"You've no strength at all. I shall fight you."

"Just as you please," said the donkey. "But let us first have a real trial of strength. When I'm by myself I never jump over a wall, I knock it down. Let me see you do that."

The lion began to pound away at the wall with his paws, but he bruised himself so badly that he had to stop. The donkey then kicked the stones furiously with his iron hoofs, and the old wall soon tumbled down.

"By jingo, you are strong!" said his companion, licking his wounded paws. "I will have you acclaimed Lord of the Lions."

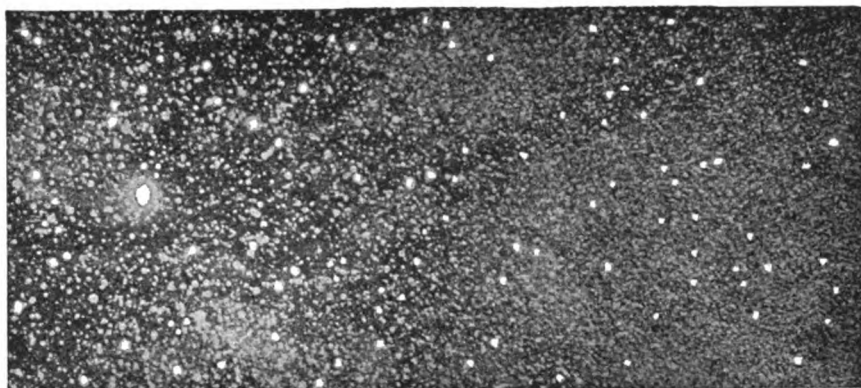
The next day all the lions of Uganda met together, and the donkey led them with a majestic air into a valley overgrown with great prickly thistles.

"Oh, don't go there, please!" all the lions cried in terror. "The prickles will get into our paws."

"Well, you are timid creatures!" said the donkey. "Now, look at me."

And, to the amazement of the assembly, he began to eat up the prickly plants. He was at once acclaimed Lord of the Lions, and as he never wanted any of the game which his subjects killed for food, he pleased them more than any other ruler they had ever had.

THE NEXT STORIES BEGIN ON PAGE 2735



THE STARS AS WE SEE THEM

WE already know that the sun is one of the stars, which means that the stars are suns. This was seen by Giordano Bruno long before it could be proved as it can now. At the present time the most promising part of astronomy is based on this mighty truth, and one of the greatest observatories in the world—it is in America—is devoted to studying the sun as one of the stars, and to studying the stars as suns. Everything we learn now about the stars helps us to understand the sun—our star; and everything we learn about the sun helps us to understand the other stars.

But we must begin at the beginning. We know that the beginning of the study of the stars was very long ago, ages even before the invention of the telescope or any kind of instrument, when men had only a pair of eyes and a good brain behind them. The Assyrians and Egyptians, the Chaldeans and the Greeks, had no telescopes and few observatories, but they learnt practically everything that was known about the stars until almost our own times. For, after all, anyone with eyes, who cares to use his eyes, can study the stars and learn a great deal about them.

The first thing men learnt was that a few of the bright points in the sky, like stars, move about or wander

CONTINUED FROM 2501



among the other stars. These wanderers, or planets, we now understand; and we keep the name "stars" for all the rest, which for many ages were called the *fixed* stars, in order to distinguish them from the *wandering* stars. There are good reasons why we should drop the word *fixed*. It is not necessary, as we can call the wandering stars *planets*, and not stars at all; and it is not true, for we know that many of the "fixed" stars move, and we have reason to believe that they are all of them moving.

If we watch these stars, however, every clear night for the whole span of our lives, we notice no movement; and this is true of most of them, even though they are watched for generations or centuries. They seem to keep the same positions compared with one another, though the whole sky seems to have moved at different times of the year or at different times of the night. The winter sky, for instance, seen from our part of the world, is much more interesting than the summer sky.

Thus it happens that men's eyes naturally came to group the stars together, and these groups, we know, are called constellations. From night to night, or year to year, the stars making up a constellation remain in the same positions beside one another;

and so, if six form a sort of coronet, men call them the crown, and so on. The proper name for these six is the Northern Crown or Corona Borealis, and you can find it in the picture on page 2613—or, much better, in the sky. Borealis is derived from Boreas, the god who was supposed to blow the north wind. But it is most important for us to understand now what could not be understood long ago.

HOW MEN THOUGHT THEY WERE LIVING IN A BALL, WITH THE STARS STUCK ON IT

When we look at the sky it seems to be a sort of dome or bowl upside down—someone has called it “that inverted bowl we call the sky”—with all the stars stuck on it, at the same level or distance from our eyes; so that what we *see* as a group of stars would really *be* a group of stars, or a constellation. And astronomers actually thought that the stars were attached to a mighty sphere, inside of which we were, and that the movements of the sky as a whole were due to this great sphere or hollow ball moving round and carrying all the stars together with it. The planets, moving separately, had to have other supposed spheres or bowls invented for them, and we may guess how complicated and impossible the whole thing grew, for it was wrong from the first. It is as if you looked across your room and thought that everything was on the same level—at the same distance from your eye. A funny notion you would have of what your room really is! But actually you see the room *in perspective*, and you know that things which lie side by side in your field of view may be, one quite near and the other at the far end of the room.

THE IMMENSE DEPTHS IN THE SKY THAT WE CANNOT REALISE

Unfortunately, we cannot see the sky in perspective. If we could—if we could get any notion at all with our eyes of the *depths* of space—much more than half of all the mistakes of astronomers could never have been made. Any boy could have corrected them the first time he was out on a fine night. Quite lately a clever Englishman has invented a way of giving us some idea of sky-perspective, or the depths of space. He has made pictures of the sky in the same way that things on the earth can be photographed as they are seen, first

through one eye and then through the other. When looked at with both eyes through a stereoscope, or “solid see-er,” these pictures give us a perspective of the sky, and we can see some stars as comparatively near, and others—which look just beside them in the sky—as shining through to us from the far depths of space. So now, perhaps, we shall understand, once and for all, that the constellations, or groups of stars, look as they do just because we see the sky on the flat, our eyes being unable to give us any idea of the tremendous depths through which the light of different stars is coming to our eyes.

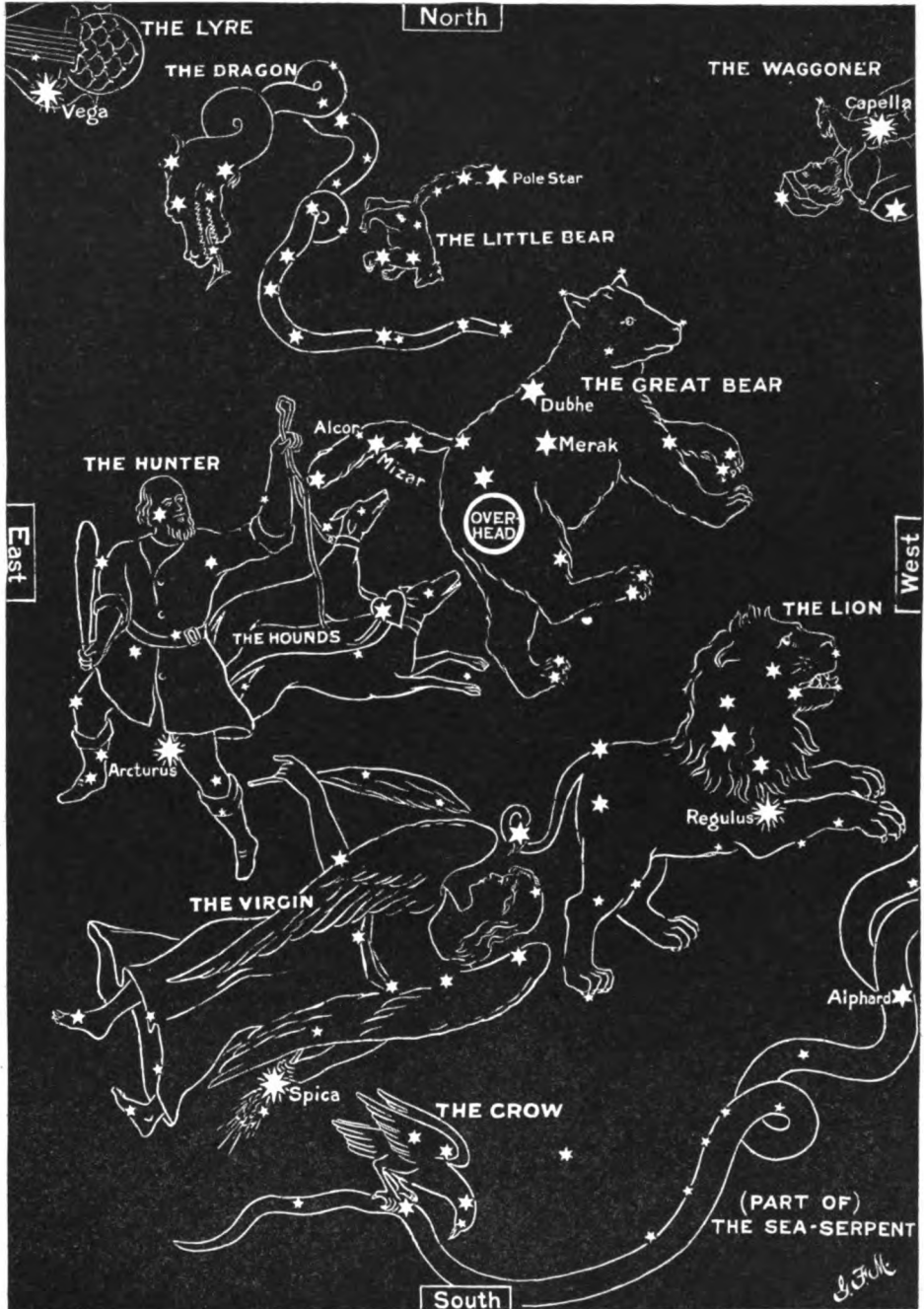
Nevertheless, of course we must learn the principal constellations, for they are the landmarks of the sky—or sky-marks, if you like—and they are always referred to when we want to say where to find a comet or a planet at any particular time. And here we may learn a very interesting thing. The “fixed” stars are not fixed, and therefore, as they move, the constellations ought to change. And so they do. The first astonishing fact about these changes is that, on the whole, they are so slight. We have names and records going back for ages; but, in general, the face of the sky is very much what it was when the study of the stars began.

THE CHANGES THAT TAKE PLACE SO FAR AWAY THAT WE CANNOT SEE THEM

Yet we now know that many of these stars are moving perhaps ten or even a hundred miles every second. This can only mean that the distances of the stars are enormous; for, of course, the nearer things are to our eyes, the greater is the visible effect of their movement, and vice versa.

But the second fact is that, though the changes seem so small, considering how long the stars have been watched by mankind, yet there are changes. For one thing, we know certain constellations, or groups of stars, which the ancients did not name, and which have received names near our own time. Knowing how carefully the old astronomers watched, and how ready they were to give names, we may reasonably believe that the reason why they took no notice of these “new” constellations, as they are called, is that they were not there to be seen. The stars making them have moved in the sky, and the

THE MAP OF THE STARS IN SPRING



As we look up at the sky at night and see the stars shining, we notice that most of them are clustered together in groups. These groups are called constellations, a word that means simply "stars together." Some of these constellations have curious names, because the people of ancient times named them after their gods, or after things which the stars were thought to resemble. As we look at these groups of stars, it is impossible for us now to see any resemblance to the things, but some modern astronomers suggest that perhaps the positions of many of the stars, as seen from the earth, have changed during the centuries, and that the groups did at one time somewhat resemble the creatures named. In these maps we see the outlines of the constellations as ancient people drew them.

To read these star-maps, stand facing the south and hold the map above the head with the top pointing north.

"new" constellations are therefore really new in the sense that, a few thousand years ago, the stars making them did not look like a group of stars, or a constellation, to the eye, as they do now.

Some of the names given to the constellations, suggesting that they look like things we know, may seem very absurd. Here, too, the fact that the stars are not really fixed may help to explain. It may be that, when the name was given, the stars were in positions that made the constellations look more like their names than some of them do now.

THE NORTHERN AND THE SOUTHERN HALVES OF THE SKY

If we consider how the earth turns in space, we shall understand that only the northern half or so of the sky can ever be seen from most of the United States. As it happens, this includes the more interesting and wonderful stars, though perhaps we may think so only because the great astronomers have all lived on the northern half of the earth, and there is scarcely more than one first-class observatory—that of Cape Colony—on the southern half of the earth yet; so that we really do not know nearly so much as we should about the southern sky.

But everyone who lives in our part of the world should know, at any rate; a few of the finest constellations and stars that can be seen from here without the use of any machinery except that by which the Greeks made such great discoveries in astronomy—a pair of eyes and a mind. The pictures show us what we really ought to know, and I will here mention the principal stars that are shown. But the pictures do not show one thing which would interfere with their clearness, and that is the northern half of the Milky Way, the great belt of stars which runs right across the entire sky, all the way round.

THE QUEER NAMES THE ANCIENT ASTRONOMERS GAVE TO THE STARS

We all should know the seven stars that form the tail and part of the body of the Great Bear. These seven stars look very like a plough, and are often called the Plough. When we see them we can always find the Pole Star, by following up the line made by the "pointers," Dubhe and Merak. Look straight at the Pole Star and that is

the *north*. Now go back to the Great Bear, and follow the course of his tail downwards and backwards, until you come to the magnificent star Arcturus. This is one of the brightest stars, which are called "first magnitude" stars. *Magnitude* is Latin for bigness. Arcturus is one of the most rapidly moving of all the flying stars, and is believed to travel about one hundred miles every second.

Another easily-seen constellation looks very like a big W, '· ·', in the sky, and is called Cassiopeia, the lady in the chair. It can never be mistaken.

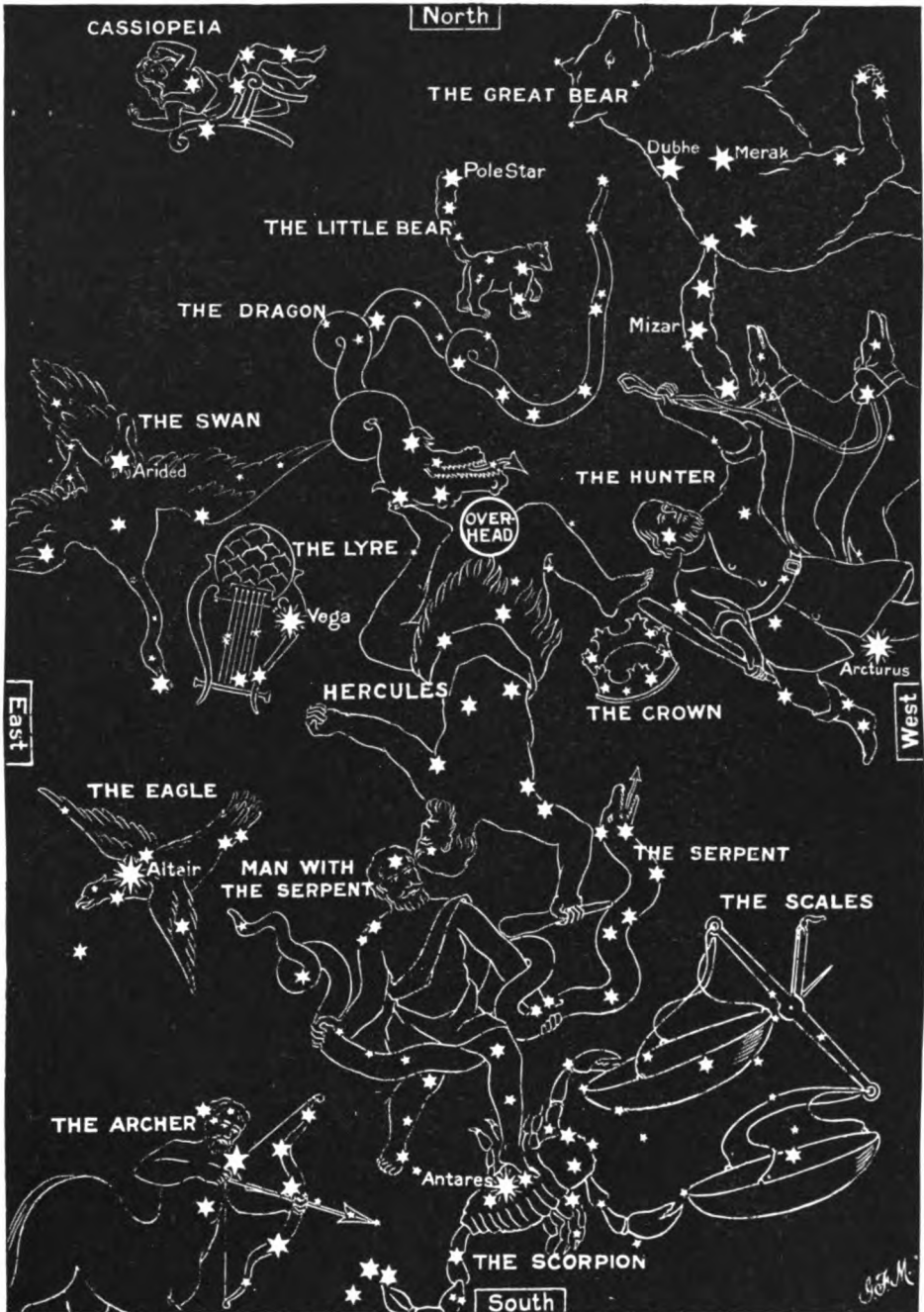
A beautiful white star of the first magnitude is Vega, in the Lyre, lying beside the Milky Way. It is specially interesting, not merely because it is one of the most beautiful stars in the sky, but because careful study shows that it is in the direction of this star that the sun, and we with him, are now moving, at the rate of about twelve miles in every second of time.

Quite near to Cassiopeia is Perseus. This can often be seen as a great L below the great W, and it is interesting because one of its stars is the celebrated double star Algol, which is really two stars, one bright and the other dark. They revolve round one another, so that every few days the dark one partly eclipses the bright one, and so Algol gets brighter and less bright every few days from age to age.

THE FINE SPECTACLE WE CAN SEE IN THE SKY ON A FEBRUARY NIGHT

The map on page 2617 shows the magnificent spectacle that we may see—and should look for—any fine evening in February and thereabouts. Below the L of Perseus, not to the left like Capella, but to the right, and lower than Capella, are the Pleiades. There is nothing in the sky like this wonderful group of stars. It is a true constellation, for the stars making it are really together. With the unaided eye we can see about seven if we are fortunate; with a glass we can see many more. With a telescope and a camera we can print the images of about thirty thousand stars in this mighty group: stars and nebulae too. In no other part of the sky is there such a tremendous amount of matter gathered together as in the Pleiades. Now run your eye down, and to the left from the Pleiades, and you come to the wonderful red star

THE MAP OF THE STARS IN SUMMER



The grouping of the stars into constellations supposed to represent animals and other things has been continued by modern astronomers because it has proved convenient for so long, and any change now would cause confusion. One of the names for a group of stars, the Plough, is a good and useful one, because the seven bright stars that form the tail and back of the Great Bear, as seen in this picture, really have the shape of a plough, and we can easily find the Plough in the sky. Of course, after giving them names, the ancients built up many fairy tales round the constellations, which professed to tell how the stars came to be there, and some of these stories will be found in other parts of this book. The Great Bear is the most easily seen of all the constellations, and two of its stars point almost in a straight line to the Pole Star, which is always to the north of us.

of the first magnitude called Aldebaran. Go on in the same line, and you reach the greatest and most splendid of the constellations, Orion. The map clearly shows how the stars of Orion make the figure of a great huntsman, with three fine stars in his belt, and three smaller ones forming the blade of his dagger. The middle one of these three last is really the most wonderful thing in the sky—it is not a star, but the Great Nebula of Orion, out of which at least six fine stars have already been formed, and doubtless many more will be formed throughout the countless ages to come. Now look downwards and to the left from Orion, and you will see Sirius, the brightest star in the whole sky—"the leader of the heavenly host." We must not suppose, however, that, if we could see all the stars in a line at equal distances from our eyes, Sirius would be the biggest. Sirius, like Algol and thousands of other stars, is really a double star. Its companion is dark, but never gets between Sirius and us, so that the brightness of Sirius does not change.

THE WONDERFUL SIGHT YOU CAN SEE ABOUT BEDTIME

Now we have come down the right side of this map, which really shows us all the greatest glories of the sky, but there are three splendid stars in it still which must be mentioned, and can easily be recognised. These are Castor and Pollux, in the heads of the twins or Gemini, and Procyon in the Little Dog.

If you learn these few stars, and look out for them when there is a chance, they will be easily remembered, and will always make the sky on a fine night vastly more interesting than it would otherwise be. And the fact that you must go to bed early does not matter, for nearly all of them are visible at just about children's bedtime, or not much after.

We might think at first that there was nothing to find out about the brightness of the stars. Anyone with eyes in his head can see that Sirius is brighter than Arcturus, and that Arcturus is brighter than any of the stars in the Pleiades. Also it is not difficult to think of ways of measuring these differences. For instance, we may compare the length of time it takes for various stars to print an image of themselves on a particular kind of photographic plate. If we assume

—though we really may not—that the light of all the stars is the same in quality, so far as its affecting a photographic plate is concerned, then we have here a means of measuring the comparative brightness of the stars.

WHY WE CANNOT UNDERSTAND THE REAL BRIGHTNESS OF THE STARS

But, when we come to think of it, we shall see that neither by this method, nor by the simple use of our eyes, nor by any other means of the kind, can we ever learn what is the brightness of the stars. We can learn how bright they appear to us, we can learn the comparative intensity of the light from them when it reaches us; but that is a very different thing. The little moon, shining by reflected sunlight, is vastly more bright than Sirius, which is probably far brighter, really, than a hundred suns. The distance makes this difference, just as it does in the lighthouses in the picture on page 2503.

What we can see and learn, then, by these means, is only the *apparent brightness* of the stars. Yet the star that seems to us the brightest in the sky, which is Sirius, might be really the faintest, and might shine brightly only because it happened to be much nearer than any of the others. Therefore, we can only learn anything about the *real* brightness of the stars by taking into account their distance.

Their distance is the first great problem of the stars. All over the world astronomers are working at it, and now we do know the distances, in a very general way, of a fair number of stars. This is how they are found.

HOW MEN FOUND OUT THE DISTANCE OF THE STARS

If a thing is very near your head, and you change the position of your head, the apparent position of the thing changes. Even if you look at it first out of one eye, and then out of the other, its apparent position changes; and if you know the distance between your two eyes, you can in this way measure the distance of the thing you are looking at. Now, in the case of a thing like the moon, or a planet, we can change our position of sight by simply noticing where it appears to be when seen first from one part of the earth, and then from another, perhaps hundreds of miles away. This base-line of a few

THE MAP OF THE STARS IN AUTUMN



We have all heard of the Zodiac, the belt in the heavens within which the sun and the principal planets move. The best known of all the constellations are those which lie within the Zodiac. They are twelve in number, and some of us have learned a little rhyme at school to help us in remembering their names. It begins like this: "The Ram, the Bull, the Heavenly Twins; and next the Crab, the Lion shines, the Virgin and the Scales." The other five groups in the Zodiac are the Scorpion, the Archer, the Goat, the Water Carrier, and the Fishes. We can see all the constellations of the Zodiac in these four star-maps, and can then find them in the sky. These names were given at least 2,500 years ago, and it is said that the Ram and the Archer were the first two constellations to be marked out and named. Of course many other constellations have been named in more recent times.

hundreds of miles is quite enough in such cases, just as the base-line no longer than the distance between your two eyes is enough for a pencil held in front of you. But the stars, even the nearest of them, are so far away that any base-line taken on our little earth is far too short.

What, then, can we do, for we cannot leave the earth? We can use the movement of the earth round the sun. We can look at the star on a certain night, and then look at it again six months later, when the earth is on the other side of the sun. This gives us a base-line about 186,000,000 of miles long—twice the earth's distance from the sun—and that is just long enough to allow us to notice a measurable difference in the apparent position of some stars, and so we can measure their distance. But there are many cases in which we notice *no difference* even when we use this tremendous base-line. Such stars are unimaginable distances away.

HOW MEN CAN TELL THE "WEIGHT" OF STARS THAT ARE OUT OF SIGHT

It is sometimes said that we can weigh the stars, but weight is not the right word to use here. By the weight of a thing, such as this book, we mean simply the amount of pull due to gravitation between it and the earth. If the earth were suddenly to become nothing, the book would lose nearly all its weight, and have left only that due to the pull of the sun. But the amount of stuff in the book would be, of course, the same as before. This amount of stuff we call its *mass*, and it is the mass of the stars that we can measure, or at least try to measure. Their "weight" means nothing, though if we know their mass we can say what their weight or gravitation pull would be at the surface of the earth.

We can measure the mass of a star sometimes when it has another star near it, for we can notice how its movement is affected. For instance, we know an almost endless number of double stars in the heavens—a pair of stars revolving round each other. They move in accordance with their gravitation pull for each other, and that depends on their mass, so that we can measure it. Thus we can even measure the mass of stars we cannot see, which is,

I think, a great triumph for astronomy.

The size of the stars is a thing we cannot find out in any direct way, and at best we can only make a guess at it. The reason is that by no possible means at our disposal can we see the disc of a star, so as to measure its diameter—that is, its size across. As no telescope shows us this, and as our study of the light from a star tells us nothing about its size, it is not easy to see a way in which its size can be measured certainly.

HOW MEN TRY TO FIND OUT THE SIZE OF THE STARS

But we are not completely baffled, for if we can learn certain other facts about a star, then we can at least *guess* its probable size. If, for instance, we know its distance, if we know its brightness, and, still more, if we know the amount of stuff in it, then we shall not be far from being able to guess what its probable size must be. But these things are very difficult to find, and the results are not very certain or precise; so the most we can say is that probably this star, or that, must be so many times as big as the sun—and that is usually the case—since it gives out so much more light.

The last point about the stars which we must mention here is their number. To find this, we need more than the eye helped by the largest telescope. We must use a photographic plate, which can see more stars than the eye, simply because the substances in the plate are more readily affected by the light of the stars than are the substances in the screen or retina of the human eye. The number of stars thus to be found is about one hundred millions. This, of course, is a very large number, but it is, after all, not much more than the human population of the United States of America.

HOW MANY STARS ARE THERE IN THE SKY?

Also we do *not* find that, with improved telescopes and cameras, the number of the stars increases, as we should expect it to do if their number were really endless. On the contrary, we have good reason to believe that there is a limit to the number of the visible stars, and therefore, probably, of the dark and invisible stars. Our universe of stars probably has a boundary; but there may be an infinite number of other universes in other parts of space.

The next part of this is on page 2715.

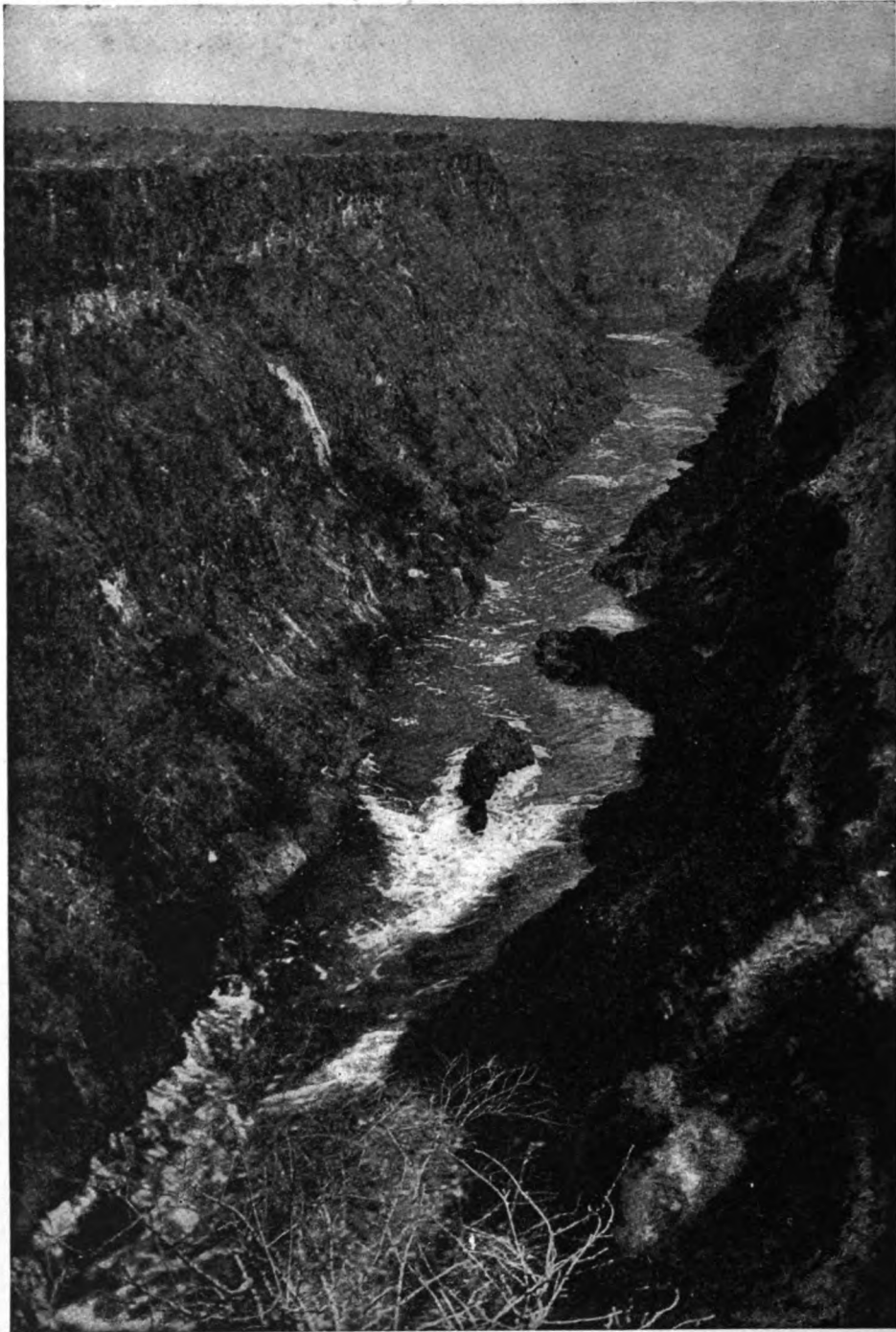
THE MAP OF THE STARS IN WINTER



The two earliest Greek writers whose works have come down to us, Homer and Hesiod, refer to some of these constellations by the same names that we give them to-day. They speak of the Bear or the Waggon, part of which is also known to us as the Plough; of Orion, whose sparkling belt of three bright stars we all know so well; of the Dog of Orion, with its brilliant starry nose formed by Sirius; and of the Pleiades. All of these constellations are shown in this picture of the sky in winter. The Bible also, in those parts of it which come to us from more ancient times, refers to stars and constellations which have been identified as the Pleiades Orion, Arcturus, and the twelve signs of the Zodiac. We can read of these by name in Job xxxviii, 31, 32.

The photograph on page 2609 was taken by Dr. Max Wolf, and is reproduced here from "Knowledge."

A RIVER RUSHING THROUGH A CHASM



This is one of the grandest sights on the great Zambesi river, which, after running 1,650 miles through South Africa, flows into the Indian Ocean opposite Madagascar. The torrent of water that dashes over the Victoria Falls rushes through this mighty chasm, but it is only in parts that the Zambesi river is like this. For hundreds of miles it is very useful for ships or boats, and may one day be as busy as the Hudson. The beginning and ending of the river are in country belonging to Portugal, but all the middle part is British.

From a photograph supplied by the British South Africa Company.



WHERE DOES CHALK COME FROM?

THE chalk seen in cliffs on the south coast of England and the chalk used on a blackboard or for drawing with are the pressed-together remains of the bodies of tiny creatures that once lived in the sea. The rest of their bodies has disappeared ages ago, but the carbonate of lime, which is chalk, has not been altered through all these years. As they died, it fell to the bottom of the sea, and was piled up there, often to very great thicknesses, as we could see for ourselves if we looked at a high chalk cliff.

This went on for many thousands of years, no doubt, but, compared with the deposits of many of the rocks formed at the bottom of the sea, the chalk deposit was quite a quick one. This means, of course, that the cliffs at such a place as Dover were once at the bottom of the sea. If you walk in many parts of England, such as Kent and Sussex, and find that you have only to scratch the soil to find chalk underneath, or if you pass in a train through a chalk cutting, you may reflect that all this was once at the bottom of the sea.

IS THERE GOLD IN THE SEA?

When we come to make a close study of earth or air or sea, we find some minute traces of all sorts of unexpected things in all of them—though it may be only one part in a million. Gold is one of the things we should

CONTINUED FROM 2508



not expect to find in sea-water, but we do find it in a quite recognisable quantity. If we consider the enormous bulk of the sea, we find that the total quantity of gold in it must be considerable. Yet, fortunately, it is not enough to repay the cost of getting it out, and so no one does so, except chemists, who do it for love of Nature and not for love of gold. I say "fortunately," because we know that the gold is worth very little in itself, *really*, and it is well that a vast quantity of human labour and life is not wasted in extracting it from the sea. If we learn to make gold quite easily—men may very well learn some day—we shall be still less inclined to seek it in sea-water, which contains things far more precious than gold.

IS THERE RADIUM IN THE SEA?

This wonderful element, radium, which at first was thought to be one of the rarest of all things, is now found to occur simply everywhere, and to be of the utmost importance wherever it occurs. We find radium in the water of rivers, and we find still more of it in the ocean wherever we look for it. It is clear that the radium, or rather the element *uranium*, from which radium is always being formed, accumulates slowly in the ocean as the rivers bear it there, just as do the salts which the rivers carry. At one time there must have been much

less radium than now in the sea, just as there must have been much less salt. Also, we find a considerable quantity of radium in the present deposits at the bottom of the sea, and in past deposits, such as chalk, for example. The total amount of radium in the deposits, or "oozes," at the bottom of all the oceans must be very large, and its consequences, both there and in the sea-water itself, are most important, because, wherever radium is, there it is constantly producing heat. We are just beginning to learn that this presence of radium in the sea and the sea's deposits must have played a part perhaps greater than any other one thing in the history of the changes which the surface of the earth has undergone.

HOW MUCH WATER IS THERE IN THE SEA?

Most of us know that much more than half the whole surface of the earth is covered with water, and if the earth had been of a slightly different size from the size it is, the whole of its surface would be one great ocean. A recent estimate of the extent of the ocean's surface may be trusted as a very careful and precise one. It is rather higher than others we have heard, and now we may take it that *five-sevenths* of the earth's surface is covered with water. If now we could learn the average depth of the sea all over the world, it would only need a big multiplication sum to answer this question.

I will not do the sum here, said the Wise Man, but I think I can tell you the other factor you need for doing it. We find great variations in the depth of the oceans—places where the highest mountain might be buried, and great shallow areas, too; but the latest result of an enormous number of soundings taken in every part of the sea, except at and round the Poles, is that the average depth of the oceans all the world over is a little under two and a half miles. This is probably a great deal deeper than you would have thought, and it means a rather long sum if you want to learn the number of *cubic miles* of water on the earth.

WHAT MAKES THE NOTE WHEN THE BOW IS DRAWN ACROSS THE FIDDLE STRINGS?

The note is, as we know, a sound-wave, or a series of to-and-fro vibrations in the air, produced by some vibrating body, which in this case is the violin

string. If the string is merely plucked, it only gives a sound that lasts for a moment; in this respect it differs from the string of a piano, which, when struck or plucked, will vibrate for several seconds. We express this difference by saying that the vibrations of a piano string or a harp string are *free*, while those of a violin string are said to be *forced*. When we play with the bow in the ordinary way, the string is forced to vibrate so long as the bow is drawn across it, but directly the bow is withdrawn the string becomes still, and does not continue to vibrate for some time, as in the case of strings that give "free vibrations." If the bow is drawn *very gently* across the string, only part of it vibrates, and so we get a beautiful, thin, soft, and very high note, which is called a *harmonic*, meaning a sound that is in harmony with the note which the whole string makes when it vibrates.

WHAT IS THE DIFFERENCE BETWEEN DISCORD AND HARMONY?

To a certain extent, harmony is a matter of taste and custom. Modern musicians play chords which strike us as quite harmonious, though we know that our ancestors thought them intolerable. But there must always remain a very real difference between harmony and discord, and we find, when we study it, that it is due to the *proportions* between the various notes that are sounded together. A musical note depends upon sound-waves of a certain rate, say, 800 little waves in a second. Now, the notes that are most harmonious with this are those in which the waves bear a very simple proportion, in their number, to 800. A note made by 1,600 vibrations in each second is, indeed, so harmonious that we do not call the two a harmony at all, for the higher note, the one with twice as many vibrations, is simply the octave of the other.

Similarly, a note of 400 vibrations in each second is the octave below. If we take the common chord which everyone knows so well, such as C, E, G, C, on the piano, which everyone finds perfectly harmonious and satisfying, we find a proportion between the vibration numbers of the notes which is correspondingly simple. If the high C were 800, the lower one would be 400, the E 500, and the G 600. In other words, the proportion of the notes in the common

chord is simply 4, 5, 6, 8. This simple proportion between the notes is the basis of harmony, and the absence of it is the basis of discord. *Why* our ears should find the one pleasant and the other painful is a question too difficult for us to answer yet.

DOES A BRIDGE SHRINK IN THE SUN?

Certainly not. On the contrary, a bridge expands, or gets larger, in the sun or in the daytime or in the summer, and shrinks, or contracts, in the shade or at night or in winter. The rule is that heat makes everything expand, while cold makes everything shrink. Cold is not a thing, but the absence of heat; and so we may say that everything occupies more or less space according to the amount of heat in it—that is, of course, if other circumstances, such as the pressure round the thing, are kept the same. Metals have a striking way of changing their volume, or size, under the influence of heat, and so this change is very noticeable in the case of iron or steel bridges such as are built nowadays. If the engineer does not know that bridges expand in the sun, he will build a bridge that is certain soon to get strained, and even to crack. He has to reckon on the amount of expansion that will occur under the influence of such heat as the bridge is likely to be exposed to, and he must allow for it. In a bridge like the Brooklyn Bridge, many inches have to be allowed for its change of size according to its temperature.

WHY, WITH A MINT WHERE MONEY IS MADE, HAS ENGLAND SUCH A BIG NATIONAL DEBT?

I am afraid we can't hope to pay the National Debt from the Mint, said the Wise Man, for the Mint does not get for nothing the gold and silver and other metals out of which it makes our money. These have to be paid for, like everything else, and that means, of course, that in the long run we pay for them. Nor does it help us at all that the Treasury Department can print paper money and put any figure it likes on it. Bills cost very little to make, but a gold eagle costs its full value, so bills are of no value in themselves, being only valuable because they represent money in existence, and they will not pay the people to whom we owe the National Debt.

No; this debt is one which can only be paid by the work and often the very lives of the people who do work in

America to-day. Every year we have to provide the interest, as it is called, on this debt, and sometimes, when the men responsible for the management of the nation's money are wise and careful, we pay off a little of the debt itself. This is the price we have to pay for the many wars of past generations, and the same is true for most countries that have a National Debt.

If every generation had to pay for its wars, there would be fewer wars, and the people who try to make them—for it is usually a few people who really make a war—would be promptly laughed at or punished, instead of being called patriots. This kind of patriots injures a nation while they are alive, and then for generations afterwards millions of people are fined and made to do without the fruits of their labour, to pay for the wars with which they had nothing to do, and which generally have done them nothing but harm. Every National Debt is a burden many times worse than an ordinary debt.

WHAT MAKES A VOLCANO?

Here is a question which no one has been able to answer. We can examine volcanoes, notice their position, and understand the character of the stuff that comes out of them; but the problem of explaining how volcanoes ever come to be formed is far too difficult for us to answer. But it seems more than probable that before long we shall be able to guess at the truth of this question, because we are just beginning to learn, in a more than vague and general way, how ordinary mountains are formed. And it is radium, this extraordinary element, of whose existence no one knew fifteen years ago, that promises to give us the key to the making of mountains and volcanoes.

We think this because we find radium in all the rocks we examine, however deep we go, just as we find it in seawater and in chalk; and if this thing, always producing large quantities of heat wherever it is, is found in all the rocks of the earth's surface, we begin to see how things like mountains, including volcanoes, may have been formed.

DOES RAIN MELT THE ROCKS?

There are two things in rain, besides the water itself, that have a great power of melting things; and even the very hardest rocks, such as granite, which

look as if no amount of rain could affect them, are melted down by it in time. These two things are called *nitric acid* and *carbonic acid*. We know the history of carbonic acid, and the nitric acid has been produced by the union of the oxygen and nitrogen in the air when electricity is discharged through it, as it is during a thunderstorm.

These acids eat away the rocks, and the weaker acid—carbonic acid—is probably the more important in this respect. It gradually melts the hard granite on which the rain falls, and so transforms it, first into sandstone, and then into sand. This process goes on very slowly, but it goes on very certainly; and in both of these respects it is like the greater number of Nature's most important processes. The two acids in rain are still more important in their relation to life; the carbonic acid, as we already know, and the nitric acid are part of the food upon which the plant lives.

WHY CAN WE SEE THROUGH GLASS, BUT NOT THROUGH THE THINGS IT IS MADE OF?

Well, glass need not be transparent, as we all know, for it may be made in such a way as to form what we call ground glass, and be only *translucent*—letting light through, but scattering it so that the objects from which it comes are not visible.

But even so it is very different from the quite opaque things, such as sand, from which it is made. The answer to the question is that the *transparency* or *opacity* of a thing depends on the way in which its molecules are arranged. Many other substances, besides glass, can be made, when they are melted, to change into what is called a *vitreous*—which is Latin for *glassy*—form; and in this the molecules lie beside one another in such a regular way that they allow light to pass through them. All glass cuts off some light—you will notice that the lenses of a pair of spectacles throw a light grey shadow on a piece of white paper—and glass has not exactly the same degree of transparency for different rays of light; but such transparency as it has, depends on the arrangement of its molecules.

Glass does not burn when it is heated, nor does the sand of which it is made. The reason is that, being fully burned, or oxidised, already, it cannot burn again.

WHY DO WE SOMETIMES GET A "STITCH" IN THE SIDE WHEN WE RUN?

When we run we require a quick renewal of the oxygen in our blood, as we are using it up very quickly in our muscles. Therefore we have to breathe quickly and deeply, and this we do especially by means of the great breathing muscle called the diaphragm, about which we read on page 1637. This muscle, though strong and broad, is rather delicate at certain points. It is attached to the inner surfaces of each of the six lower ribs, on each side of the body, by rather fine slips of fibre. These same ribs are also moved by muscles that lie between each two of them; and the explanation of a "stitch" probably is that, as the ribs move rapidly and rather forcibly when we breathe quickly and deeply, sometimes one of the attachments of the diaphragm gets a little strained, and that causes the pain we feel.

We think of a stitch as a bad thing, but that is wrong. It is a good thing, for it is the warning that prevents us from doing serious harm to the slightly strained fibres. They get a rest, and probably when we start again we so arrange as not to throw quite so much work upon them. The practised runner does not get a stitch because, by practice, he has learnt to use all his breathing muscles, though unusually hard, yet in a nicely balanced and even way, so that no part of them is strained.

WHAT MAKES US DIE?

The great cause of death among human beings is disease, and this is a most important fact, never to be forgotten, because it offers such a great contrast to the animal world. With our intelligence, and our laws and our habits of life, we have very nearly abolished death by starvation and by murder. Therefore, except for accident, we should die of old age, were it not that, for some reason or other, we are exceedingly liable to disease, which is quite a small and unimportant matter in the lives of practically all other creatures but ourselves. We are now beginning to learn that we bring nearly all diseases upon ourselves, simply because we do unnatural things, which animals and plants do not do. We eat when we are not hungry, and cheat our appetites with dainties, and so wear out the

organs that have to deal with food. We take huge quantities of alcohol, which no animal ever touches. We live in foul air, shut up from light and freshness, while our dogs and cattle, which need pure air and light no more than we do, live in the air and sunshine. We create and breathe smoke, we neglect our sleep, and do a hundred other stupid things. The penalty for this is disease, and there is no more important lesson to be learnt from the study of life than that disease is almost a peculiarity of *man*, that it is brought upon him by himself, and that it can and will be abolished when man learns a little of the wisdom which any animal, by its mode of conducting its life, is able to teach him, unless, indeed, it be a domestic animal which has caught some of our own bad habits.

WHY IS IT THAT WE DIE?

Yet when men have learnt how to avoid disease, and when death from old age is as common as it is rare to-day, even then the great fact of death will, as far as we know, remain; though it will be a very different thing from death to-day—the most terrible feature of which is that it almost always comes too soon—yet we shall still have the same problem to solve which has troubled all thoughtful people in all ages. Perhaps we can begin to discern some kind of an answer if we look, not at the life of man alone, but at all the life of the earth.

Then it will seem as if death were the necessary condition of *more life*; it will be seen that all death is yet the beginning of further life upon the earth, that nothing is really wasted or lost; and even that, if it were not for death and birth, life could never have evolved from its lowly beginnings in the humblest animals and plants to what it is already. And even in our own lives we may see that there are great compensations for death—perhaps, if we could see far enough, we should even see that death makes life worth living. The best things in life are parenthood and children and childhood. If there were no death, then there could be no birth, for there would be no room for children, and a world without a child would perhaps not be a world worth living in.

The question of food supply is practically the first question for all living things. Air is equally necessary, but

it can always be had everywhere; food is not so plentiful. The commonest cause of death among the lower creatures, both animals and plants, is starvation. This especially affects the young offspring of these creatures, and by far the greater number of all their young die from want of food.

WHAT MAKES THE LOWER CREATURES DIE?

Next to starvation, or lack of food, as a cause of death among lower creatures, is murder, if we may call it by so ugly a name. This does not apply very much to the vegetable world, as plants do not live upon each other to any great extent; but enormous numbers of young plants die because they are eaten by animals, and a small number of animals die because their bodies are invaded by tiny plants that live upon them. In the animal world, killing and being killed for the sake of food goes on without ceasing.

We must not think of it as if it were a very cruel process, involving a terrible amount of pain, for that is not so. Animals cannot suffer pain to anything like the same extent as we do, and their death is usually very swift and merciful. A single human being, in the course of his life and death, usually suffers far more pain and distress than many animals put together. What we call disease, a far more painful and cruel thing than being instantly killed, accounts for comparatively few deaths among the lower creatures.

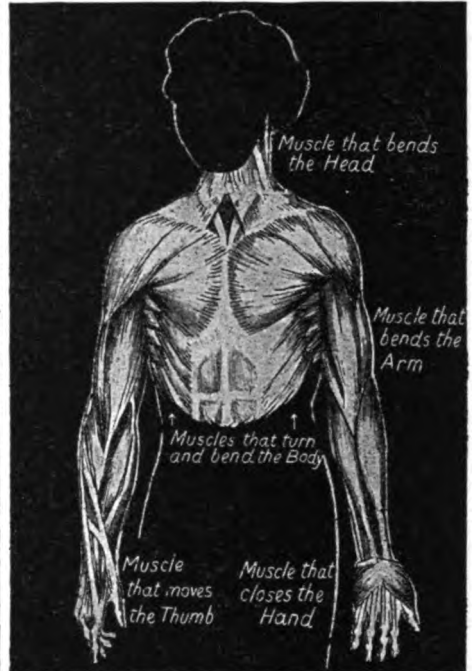
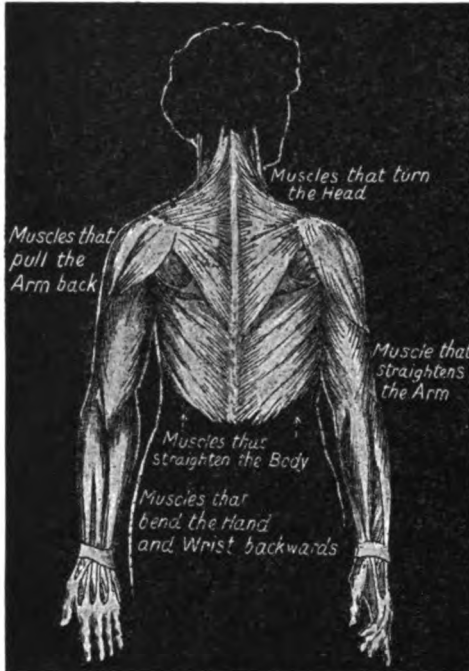
WHY DO LOBSTERS TURN RED IN BOILING?

The red colour of a boiled lobster is simply due to a chemical change that occurs in the brown colouring matter of the shell when it is heated. It is curious that red colouring matter, such as the hæmoglobin of our blood, turns brown when it is heated, but the brown of a lobster's shell turns red. If the lobster were red in the sea he would be too easily seen, and would not be able to catch his food unawares, so he would die of starvation.

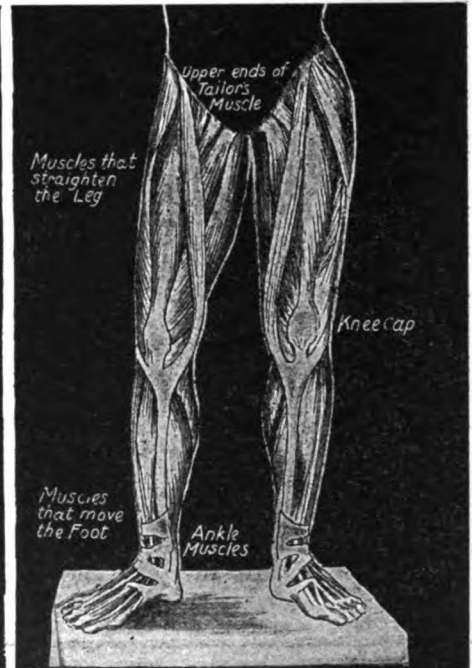
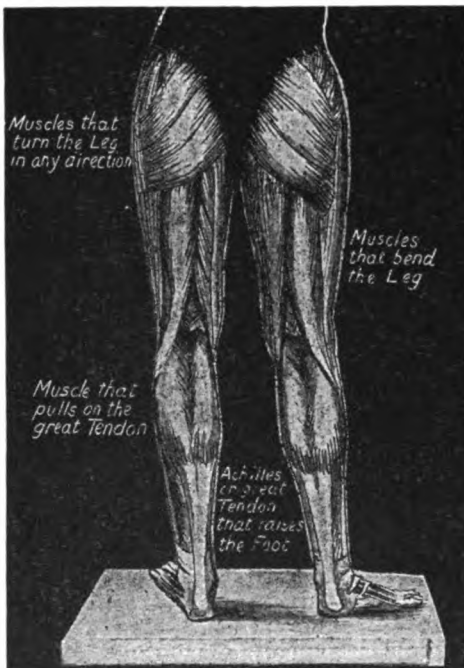
The question reminds me of the celebrated definition of a crab or a lobster as a "red fish that walks backwards." This, you know, is a perfectly correct definition, except that a lobster is not red, it is not a fish—but a much humbler kind of animal—and it does not walk backwards!

The next Questions are on page 2671.

THE MACHINERY THAT MOVES THE BODY



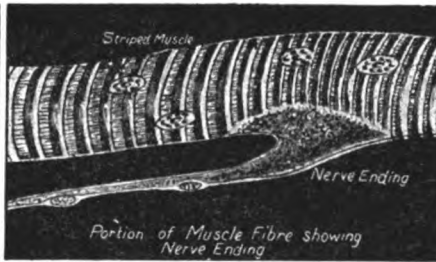
The bones of our bodies are covered nearly all over with flesh, and this flesh is called muscle. It is the muscles of the body that enable us to move about and do things, and in these pictures, which show both the back and the front of our body, we can see some of the principal muscles, and the parts of the body that they move.



The muscles are not all alike. Some are thin, flat sheets of flesh, others are long and narrow, and others thick, like big elastic ropes. They are really made up of millions of tiny living cells, that have grown into narrow threads, and become bound together in bundles. The muscles are joined to the bones by tendons, which are bands of gristle.



Cross section of Muscle
with Capillaries



Portion of Muscle Fibre showing
Nerve Ending



Lengthwise section of Muscle
with Vein, Artery & Capillaries

OUR MUSCLES & THEIR MASTERS

WE have learnt about the bones and the skeleton which they make up. We know, too, that the joints between the bones are nearly all made so that the bones can move upon one another. Now, when we come to think of it, we shall see that the only thing we can do in the world is to *move things*; and this we do by moving our own bodies, as I am moving my hand now in writing. So the question is, how the bones are moved at the joints, and if we compare the picture of a man's skeleton with the picture of what the same man would look like if his skin only were taken off, we see at once that the skeleton is clothed, nearly all over, with flesh.

At some parts the fleshy clothing of the bones is lacking; for instance, over the knuckles and one side of the shin-bone, and if we put our hand on these parts we can feel the bone very plainly just under the skin, because there is no flesh there, as on other parts of the body. But if we compare a skeleton only and a skeleton with flesh, side by side, we see that the muscles or flesh make up a very great part of the whole bulk of the body. For example, compare the thigh-bone with the thigh itself, where the bone is completely covered, from end to end, by a great group of muscles, which run down over the knee-joint. We may say that, just as the body includes a bony system; so it includes a muscular system; and we see that, in a sense, the whole body would be useless without the muscles, for they

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carry out its orders. Also the life of the body depends upon some of the muscles; for instance, those by which we breathe, and which you, and I, and every one of all the 1,600,000,000 human beings on the earth, are using at this moment.

Now, we must get right ideas of what a muscle is like. Of course, muscles vary in shape, according to the work they have to do. Some are thin and flat sheets of flesh, others are long and narrow, and so on. But the most usual kind of muscle ends in a sort of rope that runs to the bone which the muscle means to pull upon, and is firmly fixed to it. If you look at the front of your own wrist, or if you feel at the back of the knee, whether on the inside or the outside, you will find some of these strong ropes. The proper name for them is *tendons*. Sometimes they are called *sineus*. Long ago they used to be called nerves—which are utterly different things—and so, when a man wrote very strongly and powerfully, they used to say that he wrote "nervous English"—meaning *sineus* English. Nervous now means something rather the opposite of strong, and so I have explained what the phrase "nervous English" means, in order that we may not have any wrong idea in our minds when we hear it used, or read it in a book. A tendon or sinew is part of a muscle, and is quite different from the things which bind the joints together, and are called ligaments, a word which really means binding things.

In the picture on page 2627 we see that a muscle has a body, which is the red flesh, the really living part of the muscle, and a whitish rope, the tendon, by which the muscle pulls on the bone. The picture shows us the *biceps* muscle of the arm. It is so called because it has two heads or starting-places; these join and form its body, and then there comes the great tendon which ends in one of the bones of the forearm, as the picture shows.

THE GREAT MUSCLES THAT WORK OUR ARMS, AND HOW THEY GET POWER

When the biceps or any other muscle contracts, or acts, its fleshy part shortens and swells, and so the two ends of the muscle are made to approach each other. Every boy knows how the body of his biceps muscle swells when he bends his elbow; for this is the great lifting-muscle of the arm. Now, when a muscle contracts and moves things, it does work and spends power. We must find where the power comes from, for we are certain that the muscle cannot *create* it.

All muscles are richly supplied with blood. This helps to give them their red colour, though most muscles also have in them a red colouring matter which is peculiar to muscles and not found in blood. It is the blood that supplies muscles with the power which they show when they act. The burnable food-stuffs are carried to the muscle, especially sugar, which is the chief muscle food; and in the muscle they are burnt by the oxygen which the blood also sends there. This burning has two results, one which is easy to understand, and another which no one understands. The first is that heat is produced. The blood leaving a muscle is thus hotter than the blood entering it. Now we see at once why hard running or jumping makes us hot.

A LIVING MACHINE MADE UP OF MILLIONS OF PARTS

The second result of the burning in the muscle is that, as we have just learnt, the muscle shortens; but how it does so, on the instant, and returns, on the instant, no one can guess. Every machine—and a muscle is a living machine—turns some of the energy supplied to it into heat; not all into work. The more work it

gives, and the less heat, the better is the machine, for we want work and not heat. Any muscle is better in this respect than any machine ever made by man; and, further, the heat it *does* make is wanted, and properly-fed muscles never wear out.

When we examine, not the mere tendon or rope of a muscle, but its red fleshy part, we find that this consists of millions of living cells, that have grown into the form of narrow fibres or threads, and are beautifully bound together in bundles. The mystery of the contraction of a living muscle lies inside the protoplasm of the muscle-cells. We learnt about protoplasm in those parts of this book beginning on pages 1101 and 1181. The muscles of the skeleton, such as the biceps, differ from those which cover, for instance, the stomach. The first kind, which is under the influence of the will, shows tiny cross striping when seen under the microscope; the other kind, which acts apart from the will, shows no such striping. So the two kinds of muscles are called voluntary or striped, and involuntary or unstriped. *Voluntas* is Latin for the *will*.

STRENGTH OF LIFE, WHICH IS MORE IMPORTANT THAN STRENGTH OF MUSCLE

We can watch the development of a muscle from muscle-cells, which at first are round and small. When a muscle grows by exercise, certain muscle-cells, which are in it, but have never developed into active muscle-fibres, are made to develop. When they are all used up, the muscle will grow no bigger, however long or well it is exercised. Different people differ widely in the number of cells out of which they can make muscle-fibres by exercise. A man who has never given a thought to the subject may be naturally two or three times as strong as many others who may spend a large part of their lives in doing gymnastics.

The size of the muscular system is of importance in a few cases, as where a man is doing hard physical labour like lifting trunks; but it is of no importance in any other way. It has nothing to do *at all* with strength of life, or *vitality*, as it is called. But people always confuse strength of muscle, or muscularity, with strength of life, or vitality. Women are, in general, much less muscular than men, but they have more vitality. They live longer on the average, and will endure

more loss of blood, more exposure, longer starvation, a greater quantity of poison, than men will. On every possible ground, strength of life is worth having. Strength of muscle, which has no more to do with strength of life than a man's height has to do with his Christian name, is not really of much importance for human beings, who have conquered the world, and live in it, not by strength, but by skill.

It is quite right that we should desire to have our muscles in good health and fitness, but we must be sure that we clearly understand what muscles are. They are instruments of *our* purposes. In themselves, they are mere lumps of flesh, and, so far from their large size being useful to us, the larger they are the more food they require, and all the greater is the quantity of waste matter they pour into the blood. So it is an expensive matter—expensive in life as well as in money—to keep up a large staff of muscles. The only reason for taking care of the muscles

is in order that they shall be able to do their work as instruments of our will and purpose. If they can do that, we should be content. But, unfortunately, there are lots of people who tell us that the great aim of our existence should be physical culture, by which they mean making the muscles as big as we can, and these people wish us to tie ourselves by ropes and pulleys and things to our bedroom doors every morning, and then to lift weights and squeeze springs and pull indiarubber cords, and so on. For a creature who lives by mind and skill, the desire to have big muscles is absurd.

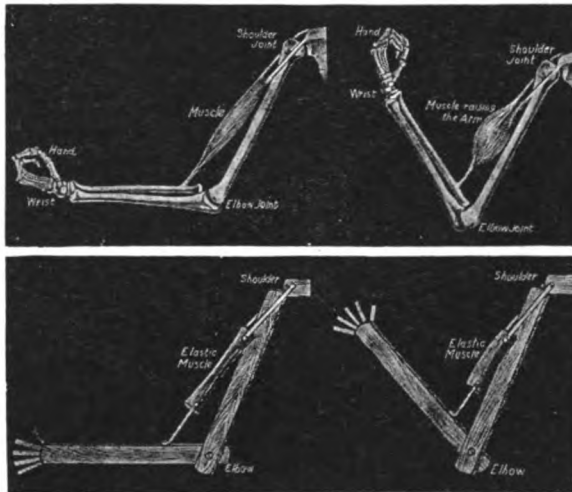
If we are to learn how to take proper care of our muscles, we must go back

to the workings of the body, and find out what happens when our muscles carry out our orders. Into every muscle of the body we find running at least one round whitish cord, which is called a nerve. One of these nerves, which runs down to give itself to several of the muscles of the forearm, passes behind the elbow for a short distance practically between the skin outside it and the hard bone underneath it. If hit, it makes us uncomfortable, and we call it the "funny-bone." It is no more a bone than it is a comet, but still that is the name we know it by. This nerve is what is called a *mixed* nerve, for it has in it nerve-fibres running to

muscles and making them move, and others running from the skin up to the brain for purposes of feeling. These two sorts of nerve-fibres are called **motor** and **sensory**. Everyone knows exactly which fingers have their skin supplied from the "funny-bone" nerve, for when it is hit we feel tingling in the little finger,

and the side of the ring finger that is next the little finger. The fibres running through the nerve from these fingers have been hit, and make us think we feel something in those fingers. The real name of the "funny-bone" is the ulnar nerve, because it runs along the bone of the forearm called the ulna.

Now we must consider the motor fibres in that and any other nerve that has motor fibres; especially we must see what we mean when we say that every muscle has motor nerve-fibres running into it. Suppose that, by an accident, the motor nerve of a muscle is cut; or suppose that, by taking too much alcohol, or lead, or arsenic, the nerve-fibres have been poisoned and



We see, in the upper picture, how one of our muscles, called the biceps, lifts the arm by swelling up and drawing the bones together. The muscles are something like elastic, expanding and contracting, and their action is explained by the lower picture, which shows a rough wooden model of the arm worked by elastic in place of muscles.

killed, so that they might just as well have been cut across, so far as the muscle is concerned. Two results always happen. The first is that the muscle cannot be used. It is paralysed, and lies still, however eagerly we try to use it. For it is motor nerves that are the motors and the masters of muscles.

MUSCLES THAT ARE THE SERVANTS OF THE NERVES

The second result is in some ways not less interesting. It is that the muscle always begins to waste and grow soft and flabby and small. And we know that the motor nerve is not merely the master of muscle, but a master that takes good care of his servant. Some kind of influence, which we understand no better than we understand any other kind of nerve-current, runs down all motor nerves to the muscles which they supply, and keeps those muscles in health.

Muscles, then, are the servants of nerves; and there is a special way of putting this which is so good that I think we ought to learn it. The word "organ" means instrument. We say that the eye or ear is the *end organ*—the instrument at the end—of the eye-nerve or the ear-nerve, just as the telephone on the desk might be called the end organ of the telephone wire. And now students of this subject have taught us that we ought to look upon muscles as the end organs of motor nerves; just the instruments which carry out their orders. If men and women—those who look after schools, who look after soldiers, or are in any way responsible for the life and guidance of others—knew this truth, that muscles are just the servants of nerves and are to be treated as such, we should soon learn how to make almost all people into the healthiest and most useful kind of human beings.

HOW THE MUSCLES WITHER AWAY IF THEIR MASTERS ARE DESTROYED

If a frog is killed, it is quite easy to separate from its leg the muscle of its calf and the nerve that is its master. If this is kept warm and moistened with water containing a little salt, it will live for quite a long time. Such a thing is called a "nerve-muscle preparation," and you may spend months doing nothing but learning from it. If you pinch the muscle, or put chemicals on it, or if you even apply certain kinds of electricity

to it, *nothing happens*; but if you do these things to the nerve, the muscle contracts so long as nerve and muscle are *alive*. *The muscle will only obey orders from its master*. Also, we can learn what weariness or fatigue is, and we find that fatigue is scarcely at all a question of muscles, but it is a question of the muscle's master—nerve. And now we must learn where the nerve comes from.

The nerve is a fibre or many fibres, running out from a nerve-cell or nerve-cells. After all, the nerve is only the channel of communication. It starts nothing, any more than the muscle does. The real master is the nerve-cell in the brain or the spinal cord. For every muscle in the body we now know the exact group of nerve-cells, in the lower part of the brain or the spinal cord. If anything destroys them, the muscle is paralysed, and will wither away. Muscle is the servant of nerve-cells, and nerves carry the orders to the muscles.

HOW EDUCATION HELPS TO GIVE US CONTROL OVER OUR MUSCLES

And this leads us to the greatest point of all. What we want, what every creature that has muscles wants, is to do things, to carry out a *purpose*. We care nothing about muscles as such, and we never give an order to any single muscle alone. Why, no animal, no child, very few grown-up people know anything about muscles; but they can do things all the same! In the highest part of the brain, where the willing is done, no muscles are represented, *as such*, by nerve-cells. The groups of nerve-cells in the brain represent, not individual muscles, but *groups* of muscles; or, we may say, *purposes*, for each group of muscles stands for a purpose. In every movement that we make, except things like those sudden twitches of the legs that we sometimes get in bed, *many* muscles are involved.

Half the education of a child consists in turning the clumsiness of the baby into the skill of the man or woman; training the muscles, not to get *big*, but to act in groups as the instruments of purposes. That is why some day we shall have more of play and games in teaching children, because Nature knows that they must have many play-purposes when they are young, if they are to carry out well their work-purposes when they are older.

The next part of this is on page 2695.



HOW GROTIUS LEFT THE CASTLE

GROTIUS, or Hugo van Groot, to give him his Dutch name, was a famous scholar, writer, and politician, born in the reign of the great Queen Elizabeth. He spoke and wrote boldly what he thought to be right in politics and religion, and so offended the Dutch Government that they condemned him to imprisonment for life, and took away all his property. They shut him up in the castle of Louvestein, but allowed his wife to stay with him.

Now, the wife of Grotius was a clever woman, and devoted to her husband, and she set her wits working to try to find a way of escape for him. But it was not till eighteen months had passed by that a way was found which promised anything like success.

Grotius spent his time in writing, and often needed to borrow books from outside the prison to help him in his work. He got permission to borrow what books he wanted, and they were sent to him in a large trunk. As he finished with the books, he returned them to a friend outside the castle, and took the opportunity of putting into the trunk clothes needing to be washed. The guards of the castle used to open the trunk and search it, but they never found anything more dangerous than the books and linen of the prisoner.

This went on until the guards grew tired of searching the trunk, and the

CONTINUED FROM 2549



keen eyes of Madame Grotius noticed how they were wearying of their duty. In a flash she saw a possibility of escape for her husband. If she could only get him into the trunk! The first thing to do was to make some holes in it to admit air. When that was done, she persuaded her husband to sit by the fire and pretend to be ill.

On the day that the trunk had to be sent away as usual, she helped Grotius to squeeze himself into it, and fastened down the lid. Then, when the man came into the room to carry away the trunk, he found the curtains of the bed drawn, and the wife with finger to her lips urging quiet for the sake of the invalid. The man hoisted the trunk on his shoulders, exclaiming at its weight; but he carried it away.

And so Grotius was taken to the house of a friend, and then, dressed like a miller, he got away to Antwerp.

But what of his wife, who had risked so much for her husband? At first she thought to delay discovery by dressing in her husband's clothes, and sitting crouched over the fire. But no gaoler appeared; so, when she had allowed time for her husband to get away, she went to the guards, told them their prisoner had escaped, and scolded them roundly for failing to do their duty. Taken aback, they let Madame Grotius walk out of the castle, and soon after she joined her husband.

THE BRAVE FRENCH MAID OF NOYON

At a house in the little town of Noyon, in France, something had gone wrong with the drains, and workmen had to be sent down to open the drain and clean out the sewer. That is a dangerous thing to do, because of the poisonous gases that are in a sewer.

In this case, four men were busily at work when they were overcome by the sewer-gas, and were unable to give the signal to be drawn up out of the sewer.

The people in the house wondered what was the matter, and grew alarmed, but no one dared venture down.

Then a brave servant maid, a girl of seventeen, in pity for the poor men, begged to be tied to the rope and let down into the sewer.

This was done, and she reached the group of men lying helpless down below. As quickly as her trembling hands would allow her, she tied one man to the rope, and jerked it as a signal for drawing him up. Willing hands hauled up the burden, and on reaching the surface the unconscious man was still alive.

A second time the girl tied a man to the rope, and he was drawn into safety.

But the next time the girl found the dangling rope come down for her to catch, she was gasping for breath. She struggled against the feeling of suffocation, and tried to fasten the third man to the rope.

This she just managed to do, but she herself would soon have been unconscious, so, with a desperate effort, she wound her long hair round the rope and tied it tightly. Then she lost consciousness; but the watchers above carefully, very carefully, pulled the double burden up into safety, just in time.

The fresh air soon revived the girl, and then she bethought her of the fourth man down in the dangerous sewer. It was hardly likely that he would still be alive; but there was a slight chance, and so again, the fourth time, this noble girl risked her life. But this time her effort was in vain, for the poor man was drawn up lifeless.

The French nation loves to reward a brave action, and some handsome gifts found their way to the unselfish maid who so cheerfully and readily risked her own life for the sake of others.

THE DEVOTION OF A ROMAN

In ancient days the city of Rome was only one among several states in the middle of Italy, though at the time of which we are telling she was already the most powerful among them. And because the other cities feared her power, having no mind to be made, one by one, the subjects of Rome, many of them, who were all called Latins, made a league against her. They gathered an army together and went up against the Romans, and the Roman army went out to meet them.

The Romans were under the command of two consuls, both of them known as valiant men. The one was Titus Manlius, surnamed Torquatus, because in his youth he had overcome in single combat a gigantic warrior of the Gauls who wore about his neck a collar of gold called a torque, which torque belonged to Manlius after he had slain the Gaul. And the other was Publius Decius Mus, who, when he was not yet in chief command, had saved the consul from defeat by his skill and valour. So these two men led their forces to the neighbourhood of Mount Vesuvius.

Now, the old Romans believed that when men died their souls were borne away to the underworld, where the gods ruled who were called Dei Manes; and they thought that the entrance to the underworld was hard by Mount Vesuvius, where the army was now encamped. Moreover, the two consuls, Manlius and Decius, dreamed each of them the same dream, in which they beheld a mighty form, veiled, which spoke to them, saying: "If the leader of the Romans shall devote himself to the Dei Manes, the Romans will vanquish the Latins; but if the Latin leader shall devote himself, then the Latins will vanquish the Romans." Now, to devote themselves meant to die willingly for the sake of their country.

So, when Manlius and Decius met on the morrow to hold counsel, they learned how each had dreamed the same dream; and each was ready to devote himself to the gods for the sake of Rome, according to the vision. Thereupon the two agreed that when they came to battle with the Latins, each leading one wing



THE BRAVE ROMAN CONSUL, DECIUS MUS, of the army, and the Latins should get the better of one wing, then the one who commanded there should devote himself to the Dei Manes, and give up his own life, hurling himself upon the foe, because the vision had said that in this way the victory of Rome would be assured.

Now, when the Romans and the Latins were set over against each other in battle array, and the armies met in the shock of combat, it befell that, on the wing where Decius commanded, the Latins made so fierce an onset that the front ranks of the Romans were driven back upon the second line. Then Decius knew that the hour had come. Thereupon he summoned the chief of the priesthood, who was called the Pontifex Maximus, and solemnly dedicated himself for a sacrifice to the Dei Manes, according to the sacred rites of the Romans. Having girded his robes in the manner of one about to offer a victim on the altars of the gods, he rushed upon the ranks of the Latins. The Roman historian Livy tells us that he appeared in the view of both

GOING TO DIE FOR THE SAKE OF ROME armies as a being much more majestic than a mere man, and as one sent from heaven to help his friends and bring destruction upon their enemies. Wherever he was carried by his horse, there the Latins were seized with panic, and though Decius fell, pierced by darts, the Romans fought with fresh ardour and the Latins fled in terror all along that wing. A messenger was sent post-haste to Manlius, on the other wing, to tell him how the bidding of the vision had been accomplished, and that Decius was slain.

Men said that Manlius was sorely grieved, because, but for the compact between them, it might have been granted to him to perform the act of self-sacrifice instead of Decius. But when the Latins understood what had befallen, as well as the Romans, both Romans and Latins believed that the gods were on the Roman side, giving to them the assurance of victory, and to the Latins the assurance of defeat; and so the promise of the vision was fulfilled.

THE MOTHER OF THE GRACCHI

THERE was once a very gracious and handsome lady in Rome named Cornelia. She might have married a king, but she preferred to be the wife of a Roman citizen. Her husband's name was Gracchus, and her two sons were called the Gracchi. She loved them devotedly, educated them in virtue and manliness, and trained them to be noble citizens of Rome.

One day there came to her home a fashionable lady, who is thus described by old Robert Burton: "Some light housewife belike, that was dressed like a May lady, and, as most of our gentlewomen are, was more solicitous of her head-tire than of her health, that spent her time between a comb and a glass, and had rather be fair than honest (as Cato said), and have the commonwealth turned topsy-turvy than her tires marred."

This fashionable companion lady "did nought but brag of her fine robes and jewels," and the noble Cornelia listened with patience, because

she was hostess to the other, and showed nothing of the disdain she felt for the poor frivolous creature.

But presently the grand lady said to Cornelia: "You must have jewels, too. Pray show me your most precious things, for I love to look upon jewels."



CORNELIA SHOWING HER "JEWELS"

Then Cornelia rose and went out of the chamber, and presently returned, leading in either hand her two manly sons. "These," said she, "are the only jewels of which I can boast."

Those sons grew to be heroic men, and all Rome knew that the mother had made them valiant and upright. In her own lifetime, a statue was raised to Cornelia, and on it was written: CORNELIA MATER GRACCHORUM, meaning

CORNELIA, MOTHER OF THE GRACCHI.

To be the mother of heroic men is a great destiny. The name of Cornelia will live for ever, and her famous sons are chiefly now remembered because they had so great and good a mother, and did credit to her training.

THE KING WHO DIVIDED HIS GOODS

AKING made a proclamation that whoever would come to him should receive whatever he cared to ask. The nobles came and asked for dukedoms and riches, and when they had been supplied, the poor people came and asked for similar gifts.

"You are too late," said the king to the poor folk. "The nobles have already had everything that I possess in this way. The only thing I have left is my power and authority as king. No one asked for this, and so I give it to you, that you may be the judges and masters of these rich nobles."

When the wealthy men heard what

the king had done, they came imploring that he would withdraw such a gift.

"We cannot have these wretches to rule over us," they said.

"I do you no wrong," replied the king. "You had what you asked for, and took, as you thought, everything, so that there should be nothing left for the poor. Divide what you have with them, and I will resume my power."

The nobles felt that this was the best thing they could do, and so the poor received a share and were made comfortable.

The next Golden Deeds begin on page 2733.

THE STORIES OF CHARLES DICKENS

WE have already seen that Dickens often wrote his stories "with a purpose." Just as "Oliver Twist" did a great deal to expose the ill-treatment of the pauper poor, so did "Nicholas Nickleby" expose the terrible state of boarding-school life about the time when the story was written, 1838. Indeed, it was the death-knell of all such schools as Dotheboys Hall, which only needed to be exposed in order that they might be put out of existence. In "Martin Chuzzlewit" there is not the same direct purpose; there the great author is only concerned with the study of interesting characters and the development of an entertaining story.

NICHOLAS NICKLEBY

IN the earlier part of last century the private schools of England were very unlike those of the present day. Anybody who cared could start a school and conduct it without the least regard to the welfare of the scholars. It is hardly possible for us to realise what many of these schools were like. In Yorkshire, particularly, the worst of them were to be found. The masters and mistresses were usually ignorant, brutal tyrants, who were totally unfit to teach the boys placed under their care, and who lived by starving their pupils and thrashing them so that they were afraid to say how badly they were treated. Many of the teachers could not have written a sentence of proper English, and knew no more of grammar than their most ignorant pupils. With the splendid endowed schools of to-day and the system of inspecting private schools, the life of the boarding-school boy or girl in England is happy compared with the awful existence of torture which the young people of the earlier years of the nineteenth century had to endure. But this is only by way of introduction to the story of Nicholas Nickleby.

The hero of this great romance was not entirely a blameless and heroic young man. He was inclined to let his temper get the better of him at times, and did many things which were the result of his inexperience; but, none the less, he was at heart a good son and brother, a loyal friend, and one who tried his best to do his duty under circumstances which were often difficult and heart-breaking. His



father had been a gentleman, but had lacked the common-sense and prudence which would have helped him to make the lives of his wife and children easier after he had gone; at his death he left Mrs. Nickleby and her children, Nicholas and Kate, quite unprovided for. Nicholas was about nineteen, and Kate a year or so younger; they had both been well instructed, but the youth was quite without any plan of earning a livelihood for himself, far less helping his mother and sister. Mrs. Nickleby herself was a foolish, gossiping woman, with no ability, and little was to be expected from her in the way of solving the great question of how to live. Indeed, she was largely to blame for their poverty, as she had advised her husband to speculate with the £1,000 (\$5,000) which he possessed, and that had been his ruin, for he lost it all, and was so distressed at the loss that he sank into despair and died.

It was at this point that the brother of the late Mr. Nickleby, Ralph, made his appearance on the scene. He was a man who made money in the City of London in doubtful ways; a miser, unscrupulous, and altogether unlike his dead brother. Mrs. Nickleby was flattered by the visit of this person, and urged Nicholas to pay every attention to what the miserly uncle had to suggest for his welfare. Mr. Ralph Nickleby began by reading this advertisement to Nicholas.

"EDUCATION. At Mr. Wackford Squeers's Academy, Dotheboys Hall, at the delightful village of Dotheboys, near Greta Bridge, in Yorkshire, Youths

are boarded, clothed, booked, furnished with pocket-money, provided with all necessities, instructed in all languages, living and dead, mathematics, orthography, geometry, astronomy, trigonometry, the use of the globes, algebra, single stick (if required), writing, arithmetic, fortification, and every other branch of classical literature. Terms, twenty guineas per annum. No extras, no vacations, and diet unparalleled. Mr. Squeers is in town, and attends daily, from one till four, at the Saracen's Head, Snow Hill. N.B.—An able assistant wanted. Annual salary £5. A Master of Arts would be preferred."

FIVE POUNDS A YEAR AS A START ON THE ROAD TO FORTUNE

"There!" said Ralph, folding the paper again. "Let him get that situation, and his fortune is made. If he don't like that, let him get one for himself. Without friends, money, recommendation, or knowledge of business of any kind, let him find honest employment in London which will keep him in shoe-leather, and I'll give him a thousand pounds. At least," said Mr. Ralph Nickleby, checking himself, "I would if I had it."

"If I am fortunate enough to be appointed to this post, sir," said Nicholas, doubtfully, "for which I am so imperfectly qualified, what will become of those I leave behind?"

"Your mother and sister, sir," replied Ralph, "will be provided for, in that case (not otherwise), by me, and placed in some sphere of life in which they will be able to be independent. That will be my immediate care; they will not remain as they are one week after your departure, I will undertake."

NICHOLAS BUILDS HIS CASTLES IN THE AIR AND DREAMS OF HAPPINESS

"Then," said Nicholas, starting gaily up, and wringing his uncle's hand, "I am ready to do anything you wish me. Let us try our fortune with Mr. Squeers at once; he can but refuse."

"He won't do that," said Ralph. "He will be glad to have you on my recommendation. Make yourself of use to him, and you'll rise to be a partner in the establishment in no time. Bless me, only think! If he were to die, why, your fortune's made at once."

"To be sure, I see it all," said poor Nicholas, delighted with a thousand

visionary ideas that his good spirits and his inexperience were conjuring up before him. "Or suppose some young nobleman who is being educated at the Hall were to take a fancy to me, and get his father to appoint me his travelling tutor when he left, and when we came back from the Continent, procured me some handsome appointment. Eh, uncle?"

"Ah, to be sure!" sneered Ralph.

"And who knows, but when he came to see me when I was settled—as he would, of course—he might fall in love with Kate, who would be keeping my house, and—and marry her, eh, uncle? Who knows?"

What an absurdly romantic picture for a young man to build upon—the prospect of being employed by one of the most notorious of the scoundrels who kept the private boarding-schools of Yorkshire! Poor Nicholas was soon to realise how foolish were his dreams, what a ruffian he had for an uncle. But he got the post of assistant, and great was his disappointment.

HOW MR. AND MRS. SQUEERS KEPT THEIR SCHOOL AT DOTHEBOYS HALL

Mr. Wackford Squeers himself was a dirty, ugly, undersized man with one eye, and that an evil one. His whole person was enough to make any healthy boy hate him, yet many parents had foolishly let their children pass into his hands and those of his no less horrid wife, who added greatly to the misery of the scholars by the way in which she treated them. The Squeers robbed the boys of their pocket-money, stole their clothes and gave them tattered garments in their place, while their own son was dressed in the best of the stolen clothes.

Dotheboys Hall was a tumble-down place, dirty and unkempt to the last degree, the schoolroom looking as though it had never once been clean. The boys who were there were also in keeping with the place; Nicholas had never seen such a collection of half-starved, ill-treated little wretches, nor thought so many could have been got together in the one place. On certain mornings the boys were given a physic of treacle and brimstone.

"Mrs. Squeers stood at one of the desks, presiding over an immense basin of brimstone and treacle, of which

delicious compound she administered a large instalment to each boy in succession, using for the purpose a common wooden spoon, which might have been originally manufactured for some gigantic top, and which widened every young gentleman's mouth considerably, they being all obliged, under heavy corporal penalties, to take in the whole of the bowl at a gasp. In another corner, huddled together for companionship, were the little boys who had arrived on the preceding night, three of them in very large leather breeches, and two in old trousers, a something tighter fit than drawers are usually worn; at no great distance from these was seated the juvenile son and heir of Mr. Squeers, a very striking likeness of his father, kicking, with great vigour, under the hands of Smike, who was fitting upon him a pair of new boots that bore a most suspicious resemblance to those which the least of the little boys had worn on the journey down—as the little boy himself seemed to think, for he was regarding the appropriation with a look of most rueful amazement.

Besides these, there was a long row of boys waiting, with countenances of no pleasant anticipation, to be treacled; and another file, who had just escaped from the infliction, making a variety of wry mouths indicative of anything but satisfaction. The whole were attired in such motley, ill-sorted, extraordinary garments as would have been irresistibly ridiculous, but for the foul appearance of dirt, disorder, and disease with which they were associated."

We can imagine after this how sad was the heart of simple Nicholas, who knew nothing of the life that was lived outside the quiet circle of his own old home. He was horrified by all he saw at Dotheboys Hall, and most of all by the inhuman way in which poor Smike, a

half-witted lad, was treated by the Squeers. Smike clung to Nicholas as a protector, and when at length Nicholas determined to go away and leave the hateful place, poor Smike ran away from the school to follow him.

Perhaps the fact that Fanny Squeers, the daughter of his master, had fallen in love with him, and did everything to make him uncomfortable when he refused to fall in love with her, was another good reason for Nicholas betaking himself far away from Dotheboys. What was Nicholas now to do? He had broken his promise to his uncle, and could not look to him for help. On leaving London, he had received a letter from one Newman Noggs, a poor clerk in Ralph Nickleby's office, telling him, if he ever needed

help, to come to him at a certain address.

Poor Newman had once been a gentleman "with horses and hounds," but had acted foolishly, lost his money, and was now reduced to the menial work of serving the miserly Nickleby in the City of London. At length Nicholas went to him, and through Newman he

became tutor to the four quaint little daughters of the Kenwigs, with their hair in two straight plaits, tied at the ends with bright ribbons.

A fine employment for a young gentleman; the salary five shillings a week! But we cannot follow Nicholas in all his adventures, which were the outcome of his ignorance of the world. He became an actor for a time in the company of Mr. Vincent Crummles, an eccentric but kind-hearted theatrical manager, and poor Smike—who turns out to be the cousin of Nicholas, and son of Ralph Nickleby—was also employed by Crummles, though Nicholas found him a hopeless pupil.

Meanwhile, Ralph Nickleby had been trying in vain to get Kate to become



Brimstone-and-treacle morning at Dotheboys Hall

friendly to Lord Verisopht, to carry out an evil scheme of his, and the Squeers were conducting Dotheboys on the old lines. At length Nicholas fell in with the Cheeryble Brothers, two old gentlemen who were rich merchants, but had once been poor boys.

THE CHEERYBLE BROTHERS HELP NICHOLAS TO MAKE A FORTUNE

It was their whole delight to do good and charitable acts, and Nicholas became their clerk, and eventually a partner in their firm. His fortune is now certain, and out of many trials happiness is coming, not only for Nicholas, but for others, while punishment is at hand for those who deserve it.

Another miserly old man, in some ways like Ralph Nickleby, but not so great a villain, would have his daughter Madeline, a lovely and affectionate girl, marry a man she hates; but he dies of heart trouble before he can force her to the wedding, and she is free to marry Nicholas, whom she loves, while Ralph Nickleby loses his money in the end, and hangs himself, all his efforts to induce his niece Kate to think of the stupid Lord Verisopht having been in vain, and Kate is reserved for the happier fate of becoming the wife of Frank Cheeryble, the nephew of the kind merchants who made the fortune of Nicholas. Newman Noggs, too, is happy and comfortable in his old age, for, having prevented a scheme of Ralph Nickleby's to swindle the Cheeryble Brothers, those gentlemen proved their gratitude by providing for him.

There are many other characters in this famous story, and we should be delighted if we could follow their history here; but it is impossible. The fate of Dotheboys, however, must be mentioned. For the villainous Squeers at last

brought himself within the clutches of the law by stealing an important document, and was sentenced to be transported. When news of this reached the school, it was the signal for a rebellion.

"It was one of the brimstone-and-treacle mornings, and Mrs. Squeers had entered school, according to custom, with the large bowl and spoon, followed by Miss Squeers and the amiable Wackford, who, during his father's absence, had taken upon himself such minor branches of the executive as kicking the pupils with his nailed boots, pulling the hair of some of the smaller boys, pinching the others in aggravating places, and rendering himself in various similar ways a great comfort and happiness to his mother. Their entrance, whether by premeditation or a simultaneous impulse, was the signal of revolt.

THE SCHOOL AT DOTHEBOYS HALL BREAKS UP FOR EVER

"While one detachment rushed to the door and locked it, and another mounted the desks and forms, the stoutest (and consequently the newest) boy seized the cane, and, confronting Mrs. Squeers with a stern countenance, snatched off her cap and beaver-bonnet, put it on his own head, armed himself with the wooden spoon, and bade her, on pain of death, go down upon her knees and take a dose directly. Before that estimable lady could recover herself, or offer the

slightest retaliation, she was forced into a kneeling posture by a crowd of shouting tormentors, and compelled to swallow a spoonful of the odious mixture, rendered more than usually savoury by the immersion in the bowl of Master Wackford's head, whose ducking was entrusted to another rebel. The success of this first achievement prompted the malicious crowd, whose



THE TABLES TURNED ON MRS. SQUEERS
The boys make her take her own brimstone and treacle

faces were clustered together in every variety of lank and half-starved ugliness, to farther acts of outrage. The leader was insisting upon Mrs. Squeers repeating her dose, Master Squeers was undergoing another dip in the treacle, and a violent assault had been commenced on Miss Squeers, when John Browdie, bursting open the door with a vigorous kick, rushed to the rescue. The shouts, screams, groans,

hoots, and clapping of hands suddenly ceased, and a dead silence ensued."

John Browdie was a fine, old-fashioned Yorkshire grain-dealer, who knew of the state of things at Dotheboys from having befriended poor Smike when he ran away to join Nicholas. Mr. Browdie quelled the riot, but told the scholars to leave the hateful place, which they did without more ado, and Dotheboys Hall broke up for ever.

THE STORY OF MARTIN CHUZZLEWIT

IN a little Wiltshire village near Salisbury there used to stand a comfortable inn, the Blue Dragon, owned by a very comely, plump, and dimpled widow named Mrs. Lupin. She had "roses on her ample skirts, and roses on her bodice, roses in her cap, roses on her lips," bright black eyes, and jet-black hair. A charming, cheery picture indeed! The night before our story begins there had come to her inn an old man, and with him was a very pretty girl of about seventeen years. Mrs. Lupin was naturally curious, and could not understand how these two were related; they were not father and daughter, and could not be husband and wife. Now, this gentleman was old Martin Chuzzlewit, and he had a very peculiar character. He had adopted Mary Graham, an orphan, and, although he gave her an annual allowance, he had vowed to leave her without a single penny when he died. He was very rich and, as you will see, very eccentric. He had been troubled so greatly by poor relations, who professed to be his friends on account of his money, that he determined that before he died he would have his revenge on them for their greed. Martin Chuzzlewit had been travelling, and had come to the Blue Dragon to rest for a time because of ill-health. Close by lived one of his relations—the one he hated most of all!

MR. PECKSNIFF, THE HYPOCRITE, AND HOW HE MADE HIS LIVING

The name of this person was Seth Pecksniff, an architect—a man who was regarded by all the villagers as one of the best and saintliest of men. He wore his iron-grey hair brushed off his forehead and standing bolt upright; his eyelids were heavy, and his manner was soft and oily. His wife was dead, but he was not a lonely man, for he

had two daughters, Charity and Mercy, or, as he called them, Cherry and Merry. The elder was very prim and stiff; the younger one very kittenish and playful. Mr. Pecksniff called himself an "architect and land surveyor," but nobody ever knew of any house he had built, or of any land he had surveyed, except that which he could see from his own windows. You might wonder, then, how he made any money, but it was made by his having pupils to whom he taught architecture. They lodged with him, and usually they left before long, calling him dreadful names and hating him very much; but he would cast his eyes up to the ceiling and look greatly hurt at such treatment. The one person who admired him through all was his timid, good-hearted assistant, Tom Pinch.

YOUNG MARTIN CHUZZLEWIT BECOMES THE PUPIL OF MR. PECKSNIFF

Mr. Pecksniff expected a new pupil, and he was rather alarmed that he should happen to be a Martin Chuzzlewit, the grandson of the visitor at the inn. He sent Tom Pinch to Salisbury to meet him and bring him home, and Tom was delighted at the thought of his driving to town; it was quite like an adventure, and he was proud of his importance. He was too simple-hearted to notice any selfishness in Martin desiring the whole of the fire for himself, or that he was obliged to sit in the trap with the new pupil's trunk under his feet, so that he could see scarcely anything but his knees. Mr. Pecksniff and his daughters welcomed Martin to the house, and overwhelmed poor Tom with attentions which embarrassed him; he was not used to much kindness, but as he believed no ill of anyone in the world, perhaps that did not matter.

Before young Martin had time to settle down thoroughly in his new home,

Mr. Pecksniff found that he would have to go to London on important business ; so he left the two young men in charge of the house, taking with him his two fond daughters. They had been in London for a day or so, when Mr. Pecksniff was summoned on his business, which seemed to be very secret.

Now, we must know that when old Martin had been at the Blue Dragon he had an interview with Mr. Pecksniff, in which he told that hypocrite a few unpleasant truths about himself. It was he who now wished to meet him in London.

OLD MARTIN BEGINS HIS LITTLE PLOT TO UNMASK MR. PECKSNIFF

When Mr. Pecksniff went to see old Martin, he took with him Merry and Cherry, who were, of course, charmed to know the old man, and greatly delighted at a proposed new arrangement between the cousins. Old Martin, it now appeared, wished to board with the Pecksniffs in their house, and, of course, Mary Graham must come too. But first he explained that his grandson must go, as he was very angry with him for having fallen in love with Mary.

Before returning to their home, the Pecksniffs visited some other cousins, one of whom, Jonas Chuzzlewit, fell in love with Merry. This Jonas was one of the most hateful of men imaginable, grasping and cruel, and was always reproaching his poor old father because he did not die and leave his money to him! When Mr. Pecksniff was home again he spoke to Tom Pinch, but would not even glance at his pupil. This so enraged the haughty, self-willed young man that he knocked Mr. Pecksniff down, and left his house for ever. But, you see, the wily "architect" had got rid of him.

YOUNG MARTIN AND MARK TAPLEY SEEK THEIR FORTUNES IN AMERICA

There was only one thing now for Martin to do, he thought, and that was to go abroad and make his fortune. So he bade his sweet Mary farewell, and sailed for New York. Mary gave him a valuable diamond ring, which he took, thinking it was from his grandfather ; he did not consider others sufficiently to know that she had bought it with her own savings in case he should ever be in want. With him there went an ostler of the Blue Dragon, named Mark Tapley, who adored Mrs. Lupin, and left

her employment simply because she was so good to him, and he was so happy there that he thought there was no credit in his being contented. What he wanted was a situation which would make anyone else miserable, and in such a place he would strive to keep "jolly." When he had known young Martin for only a little time, he could see that gentleman had a good deal of selfishness in him, and concluded that here was the very unpromising sort of master to whom he should act as servant.

In New York they went to an office to find out a place which would be suitable for an architect, and spent all their money in buying some land on an island with the pleasant name of Eden. They went by steamboat to this place, but, when they were once landed, there was no means of getting away again ! The people of the island were all half-starved skeletons, their houses broken-down hovels, and their own abode a miserable log-cabin. Before long Martin was struck down with fever, and Mark nursed him tenderly, and also did all that he could to help his poor neighbours. Here, at last, he could take credit for being "jolly"—the word which his poor lips strove to frame when he, in his turn, was attacked by the fever, and Martin had to nurse him.

YOUNG MARTIN BECOMES A BETTER MAN THROUGH SUFFERING

To Martin it was not without its benefit, this stern discipline of pain ; for whilst he and Mark were recovering, Martin had plenty of time to think of his past life with regret, and to resolve that if he were spared in the future he would show himself to be a changed man ; indeed, he almost disappointed Mark, who felt there would soon be no credit in being jolly with such a good master and friend !

But we must turn our thoughts back to the old village in Wiltshire again, where Tom Pinch was never so happy as when he was playing on the church organ, and Mary Graham would steal in quietly and slip out again without his taking any notice of her presence, in case his observing her should frighten her away. One day Mr. Pecksniff came softly into the church, unseen, and fell asleep in a pew. When he wakened he heard Tom and Mary talking about him, and he listened to their conversation.

Mary revealed to him Mr. Pecksniff in his true character—how he was a mean, hypocritical, designing man, and how he had proposed marriage to her so that he might gain his own selfish ends. Tom was deeply in love, in his simple, unselfish way, with Mary, and when he knew of this proposal he understood he had been deceived for years in his master. When Mr. Pecksniff reached home, fearing Tom would disclose his knowledge, he discharged him in a way that made it appear he was doing something very painful to himself, but which was the only righteous course for him under the circumstances.

TOM PINCH AND HIS SISTER ARE HELPED IN LONDON BY AN UNKNOWN FRIEND

Going to London, poor Tom met an old friend of his, John Westlock, a former pupil of Pecksniff's, and before long some employment was given to him in such a mysterious way that he did not know who might be his employer, but only that his salary was so good that it enabled him to set up housekeeping for himself with his pretty sister, Ruth, who had been badly treated by some rich people to whose daughter she was governess. But now a sad thing happened to Merry Pecksniff. Although she was the daughter of a deceitful man, she had some good feeling left in her young heart, and many foolish ideas too. She foolishly married her cousin Jonas, whom she rightly disliked, for the sake of spiting her sister Cherry, to whom he had first made love.

The old father of Jonas had died, and Jonas now became friendly with some men who had a large office in the City, seemed very wealthy, and made him feel very proud of himself when they told everyone of his cleverness.

WHAT HAPPENED TO THE WICKED JONAS CHUZZLEWIT

But these flatterers soon robbed Jonas of his hoardings, for he was not so clever as he thought. He had long ago showed his cruelty towards his pretty, silly young wife—he had even struck her—but now his passion at the thought of his lost money knew no bounds. He followed the man who had been the chief cause of his losing his wealth, and in a dark wood he killed him, leaving his body hid amongst the leaves. The murder was discovered, the murderer tracked, and Jonas was guarded in his

room until a coach should come to take him to gaol. Bribing the man who watched him with a promise of one hundred pounds, he was allowed five minutes in another room. When the coach arrived he entered, and was driven off; but before the gaol was reached he had freed himself from the power of man, and in his dead hand he held a bottle of poison. Thus poor Merry was left the widow of a murderer. It was also proved that Jonas had tried to poison his father, who had seen through his plan and avoided it; but the knowledge of his son's guilt broke the old man's heart, while Jonas himself believed that he had really poisoned him.

But all life is not sorrow, and where trouble comes to those who have been happy, it also happens that good fortune comes to those who have passed through many trials. Young Martin came home again from America with the jolly ostler, who resolved that it would be best to marry Mrs. Lupin and be jolly with her; the name of the inn was changed to the Jolly Tapley.

PECKSNIFF IS PUNISHED AND OLD MARTIN MAKES EVERYBODY ELSE HAPPY

Old Martin Chuzzlewit now summoned to him his grandson, Mark, Tom Pinch, Ruth, Tom's old friend, Westlock, and Mr. Pecksniff. Before the whole assembly he told them of his purpose in staying at the house of such a man. He had watched everything that had been done, scarcely able to control himself at times; had pretended friendship for the horrid Pecksniff; but at last he had come to the end of his endurance. He now rose from his chair, and with his stick he felled Pecksniff to the ground; while all stood around, amazed at the old man's anger. From that day Pecksniff put away all pretence of being a good man, and, with his daughter Cherry, fell to begging money from people.

Old Martin Chuzzlewit forgave his grandson freely for all his wilful conduct in the past, and gladly consented to his marriage with Mary. He also told them that he had been Tom's patron, giving him his pleasant situation in London. And now his kindness extended farther, and in his new goodness of heart he strove to console poor Merry for her sorrows, and to show her that she might yet have some happiness in life. The next stories of Famous Books are on 2757.

"THERE'S A CRY AND A SHOUT, AND NO END OF A ROUT, AND MONKS HAVE THEIR POCKETS ALL TURNED INSIDE OUT."



This picture of "The Jackdaw of Rheims," painted by Frank Hyde, is reproduced by permission of Messrs. Louis Wolf & Co. See poem on page 2647

The Child's Book of POETRY



JOHN GILPIN

WILLIAM COWPER, in this celebrated ballad, has made fun, in his own quiet way, of a very worthy old linen-draper who used to have a shop in Paternoster Row, London, where he died in 1791 at the age of ninety-eight. The story was told to the poet by a lady friend in order to entertain him, as he was inclined to melancholy, and, thanks to his genius, it has served to amuse multitudes of readers, and will ever remain a favourite with the countrymen of the poet and the linen-draper. The charming illustrations which we give with the poem are from the well-known drawings of the late Randolph Caldecott, a famous humorous artist.

JOHN GILPIN was a citizen
Of credit and renown,
A train-band captain eke
was he
Of famous London town.

John Gilpin's spouse said to her dear,
"Though wedded we have been
These twice ten tedious years, yet we
No holiday have seen.

"To-morrow is our wedding day,
And we will then repair
Unto the Bell at Edmonton,
All in a chaise and pair.

"My sister and my sister's child.
Myself, and children three,
Will fill the chaise; so you must ride
On horseback after we."

He soon replied, "I do admire
Of womankind but one,
And you are she, my dearest dear,
Therefore it shall be done.

"I am a linen-draper bold
As all the world doth know;
And my good friend, the Calender,
Will lend his horse to go."

Quoth Mrs. Gilpin, "That's well said;
And for that wine is dear,
We will be furnish'd with our own,
Which is both bright and clear."

CONTINUED FROM 2484



John Gilpin kiss'd his
loving wife;
O'erjoy'd was he to find
That, though on pleasure she
was bent,
She had a frugal mind.

The morning came, the chaise was
brought,
But yet was not allowed
To drive up to the door, lest all
Should say that she was proud.

So three doors off the chaise was stay'd,
Where they did all get in,
Six precious souls, and all agog
To dash through thick and thin.

Smack went the whip, round went the
wheels,
Were never folk so glad;
The stones did rattle underneath,
As if Cheapside were mad.

John Gilpin, at his horse's side,
Seiz'd fast the flowing mane,
And up he got, in haste to ride,
But soon came down again.

For saddle-tree scarce reach'd had he,
His journey to begin,
When, turning round his head, he saw
Three customers come in.

So down he came; for loss of time,
Although it grieved him sore,
Yet loss of pence, full well he knew,
Would trouble him much more.

'Twas long before the customers
Were suited to their mind,
When Betty, screaming, came downstairs,
"The wine is left behind!"



"Good lack!" quoth he, "yet bring it me,
My leathern belt likewise,
In which I bear my trusty sword
When I do exercise."

Now Mistress Gilpin (careful soul!)
Had two stone bottles found,
To hold the liquor that she loved,
And keep it safe and sound.

Each bottle had a curling ear,
Through which the belt he drew
And hung a bottle on each side,
To make his balance true.



Then over all, that he might be
Equipp'd from top to toe,
His long red cloak, well brush'd and neat,
He manfully did throw.

Now see him mounted once again
Upon his nimble steed,
Full slowly pacing o'er the stones,
With caution and good heed.

But finding soon a smoother road
Beneath his well-shod feet,
The snorting beast began to trot,
Which gall'd him in his seat.

So, "Fair and softly," John he cried,
But John he cried in vain;
That trot became a gallop soon,
In spite of curb and rein.

So stooping down, as needs he must
Who cannot sit upright,
He grasp'd the mane with both his hands,
And eke, with all his might.

His horse, who never in that sort
Had handled been before,
What thing upon his back had got
Did wonder more and more.

Away went Gilpin, neck or nought;
Away went hat and wig;
He little dreamt, when he set out,
Of running such a rig.

The wind did blow, the cloak did fly,
Like streamer long and gay,
Till loop and button failing both,
At last it flew away.

Then might all people well discern
The bottles he had slung;
A bottle swinging at each side,
As hath been said or sung.

The dogs did bark, the children scream'd,
Up flew the windows all;
And every soul cried out, "Well done!"
As loud as he could bawl.



Away went Gilpin—who but he?
His fame soon spread around,
"He carries weight! he rides a race!
'Tis for a thousand pound!"

And still as fast as he drew near,
'Twas wonderful to view
How in a trice the turnpike men
Their gates wide open threw.

And now, as he went bowing down
His reeking head full low,
The bottles twain behind his back
Were shatter'd at a blow.



Down ran the wine into the road,
Most piteous to be seen,
Which made his horse's flanks to smoke
As they had basted been.

Bat still he seem'd to carry weight,
With leathern girdle braced;
For all might see the bottle necks
Still dangling at his waist.

Thus all through merry Islington
These gambols he did play,
Until he came unto the Wash
Of Edmonton so gay;

And there he threw the wash about
On both sides of the way,
Just like unto a trundling mop,
Or a wild goose at play.

At Edmonton his loving wife
From the balcony spied
Her tender husband, wondering much
To see how he did ride.

"Stop, stop, John Gilpin, here's the house!"
They all aloud did cry;
"The dinner waits, and we are tired."
Said Gilpin, "So am I!"

"What news? What news? Your tidings
Tell me you must and shall— [tell;
Say, why bare-headed you are come,
Or why you come at all?"

Now Gilpin had a pleasant wit,
And loved a timely joke;
And thus, unto the Calender,
In merry guise he spoke:

"I came because your horse would come;
And, if I well forebode,
My hat and wig will soon be here,
They are upon the road."

The Calender, right glad to find
His friend in merry pin,
Return'd him not a single word,
But to the house went in.

Whence straight he came, with hat and wig,
A wig that flowed behind;
A hat not much the worse for wear,
Each comely in its kind.

JOHN GILPIN ON HIS WILD CAREER THROUGH MERRY ISLINGTON



The dogs did bark, the children scream'd, up flew the windows all;
And every soul cried out, "Well done!" as loud as he could bawl.

But yet his horse was not a whit
Inclin'd to tarry there;
For why? his owner had a house
Full ten miles off, at Ware.

So like an arrow swift he flew,
Shot by an archer strong;
So did he fly—which brings me to
The middle of my song.

Away went Gilpin out of breath,
And sore against his will,
Till, at his friend the Calender's,
His horse at last stood still.

The Calender, amazed to see
His neighbour in such trim,
Laid down his pipe, flew to the gate,
And thus accosted him.

He held them up, and in his turn
Thus show'd his ready wit:
"My head is twice as big as yours,
They therefore needs must fit.

"But let me scrape the dust away,
That hangs upon your face;
And stop and eat, for well you may
Be in a hungry case."

Said John, "It is my wedding day,
And all the world would stare,
If wife should dine at Edmonton,
And I should dine at Ware."

So, turning to his horse, he said:
"I am in haste to dine;
'Twas for your pleasure you came here,
You shall go back for mine."

JOHN GILPIN CANNOT STOP AT THE INN



At Edmonton his loving wife from the balcony spied
 Her tender husband, wondering much to see how he did ride.
 "Stop, stop, John Gilpin, here's the house!" they all aloud did cry;
 "The dinner waits, and we are tired." Said Gilpin, "So am I!"

Ah, luckless speech, and bootless boast !
 For which he paid full dear ;
 For, while he spake, a braying ass
 Did sing most loud and clear ;
 Whereat his horse did snort, as he
 Had heard a lion roar,
 And gallop'd off with all his might,
 As he had done before.
 Away went Gilpin, and away
 Went Gilpin's hat and wig ;
 He lost them sooner than at first,
 For why ?--they were too big.
 Now Mrs. Gilpin, when she saw
 Her husband posting down

Into the country far away,
 She pull'd out half-a-crown.
 And thus unto the youth she said,
 That drove them to the Bell,
 " This shall be yours, when you bring back
 My husband safe and well."
 The youth did ride, and soon did meet
 John coming back again ;
 Whom in a trice he tried to stop,
 By catching at his rein ;
 But not performing what he meant,
 And gladly would have done,
 The frightened steed he frighted more,
 And made him faster run.

Away went Gilpin, and away
Went postboy at his heels
The postboy's horse right glad to miss
The rumbling of the wheels.

Six gentlemen upon the road
Thus seeing Gilpin fly,
With postboy scampering in the rear,
They rais'd a hue and cry :

" Stop thief ! Stop thief ! A highwayman ! "
Not one of them was mute ;
And all and each that passed that way
Did join in the pursuit.

And now the turnpike gates again
Flew open in short space :
The toll-men thinking, as before,
That Gilpin rode a race.

And so he did, and won it too,
For he got first to town ;



Nor stopp'd till where he had got up
He did again get down.

Now let us sing, long live the king,
And Gilpin, long live he ;
And, when he next doth ride abroad,
May I be there to see.



KING LEAR AND HIS THREE DAUGHTERS

In the CHILD'S STORY OF FAMOUS BOOKS we read elsewhere the story of " King Lear," as Shakespeare treats it in the famous tragedy of that name. It was there stated that Shakespeare's great tragedy was founded upon an old

English legend, and here is the legend, as told in an old ballad, the author of which is, of course, unknown. In the ballad the king's name is spelt Leir, but we have given it the same spelling as it has in Shakespeare's play.

KING LEAR once ruled in this land
With princely power and peace ;
And had all things with heart's content,
That might his joys increase.
Amongst those things that Nature gave,
Three daughters fair had he,
So princely seeming, beautiful,
As fairer could not be.

So on a time it pleased the king
A question thus to move,
Which of his daughters to his Grace
Could shew the dearest love ;
" For to my age you bring content,"
Quoth he, " then let me hear,
Which of you three in plighted troth
The kindest will appear."

To whom the eldest thus began :
" Dear father, mind," quoth she,
" Before your face to do you good,
My blood shall rendered be ;
And for your sake my bleeding heart
Shall here be cut in twain,
Ere that I see your reverend age
The smallest grief sustain."

" And so will I," the second said,
" Dear father, for your sake,
The worst of all extremities
I'll gently undertake ;
And serve your Highness night and day
With diligence and love,
That sweet and quietness
Discomforts may remove."

" In doing so, you glad my soul,"
The aged king replied ;
" But what sayest thou, my youngest girl,
How is thy love allayed ? "
" My love " (quoth young Cordelia then)
" Which to your Grace I owe,
Shall be the duty of a child,
And that is all I'll show."

" And wilt thou show no more," quoth he,
" Than doth thy duty bind ? "
I well perceive thy love is small
When as no more I find.
Henceforth I banish thee my court,
Thou art no child of mine ;
Nor any part of this my realm
By favour shall be thine.

"Thy elder sisters' loves are more
Than I can well demand,
To whom I equally bestow
My kingdom and my land,
My pompal state and all my goods,
That lovingly I may
With those thy sisters be maintained
Until my dying day."

Thus flattering speeches won renown
By these two sisters here ;
The third had causeless banishment,
Yet was her love more dear ;
For poor Cordelia patiently
Went wandering up and down,
Unhelped, unpitied, gentle maid,
Through many an English town.

Until at last in famous France
She gentler fortunes found ;
Though poor and bare, yet she was deemed
The fairest on the ground ;
Where, when the king her virtues heard,
And this fair lady seen,
With full consent of all his court,
He made his wife and queen.

Her father King Lear this while
With his two daughters stayed :
Forgetful of their promised loves,
Full soon the same decayed ;
And living in Queen Regan's court,
The eldest of the twain,
She took from him his chiefest means,
And most of all his train.

For whereas twenty men were wont
To wait with bended knee,
She gave allowance but to ten,
And after scarce to three ;
Nay, one she thought too much for him ;
So took she all away,
In hope that in her court, good king,
He would no longer stay.

"Am I rewarded thus," quoth he,
"In giving all I have
Unto my children, and to beg
For what I lately gave ?
I'll go unto my Goneril :
My second child, I know,
Will be more kind and pitiful,
And will relieve my woe."

Full fast he hies then to her court ;
Where, when she heard his moan,
Returned him answer, that she grieved
That all his means were gone.
But no way could relieve his wants ;
Yet, if that he would stay
Within her kitchen, he should have
What scullions gave away.

When he had heard with bitter tears,
He made his answer then ;
"In what I did, let me be made
Example to all men.
I will return again," quoth he,
"Unto my Regan's court ;
She will not use me thus, I hope,
But in a kinder sort."

Where, when he came, she gave command
To drive him thence away ;
When he was well within her court
(She said) he would not stay.

Then back to Goneril,
The woeful king did hie,
That in her kitchen he might have
What scullion boys set by.

But there of that he was denied,
Which she had promised late :
For once refusing, he should not
Come after to her gate.
Thus 'twixt his daughters, for relief
He wandered up and down ;
Being glad to feed on beggar's food,
That lately wore a crown.

And calling to remembrance then
His youngest daughter's words,
That said the duty of a child
Was all that love affords ;
But doubting to repair to her,
Whom he had banished so,
Grew frantic mad ; for in his mind
He bore the wounds of woe :

Which made him rend his milk-white locks
And tresses from his head,
And all with blood bestain his cheeks,
With age and honour spread.
To hills and woods and watery founts
He made his hourly moan,
Till hills and woods and senseless things
Did seem to sigh and groan.

Even thus possessed with discontents,
He passed o'er to France,
In hopes from fair Cordelia there,
To find some gentler chance ;
Most virtuous dame ! which when she heard
Of this her father's grief,
As duty bound, she quickly sent
Him comfort and relief.

And by a train of noble peers,
In brave and gallant sort,
She gave in charge he should be brought
To Aganippus' court ;
Whose royal king, with noble mind,
So freely gave consent,
To muster up his knights at arms,
To fame and courage bent.

And so to England came with speed,
To repossess King Lear,
And drive his daughters from their thrones
By his Cordelia dear.
Where she, true-hearted, noble queen,
Was in the battle slain :
Yet he, good king, in his old days,
Possessed his crown again.

But when he heard Cordelia's death,
Who died indeed for love
Of her dear father, in whose cause
She did this battle move :
He swooning fell upon her breast,
From whence he never parted ;
But on her bosom left his life,
That was so truly hearted.

The lords and nobles when they saw
The end of these events,
The other sisters unto death
They doomed by consents ;
And being dead, their crowns they left
Unto the next of kin ;
Thus have you seen the fall of pride,
And disobedient sin.

THE JACKDAW OF RHEIMS

AN INGOLDSBY LEGEND. By Richard Harris Barham

RICHARD HARRIS BARHAM, who died in 1845, was an English clergyman. He wrote many comic tales in verse under the name of "Thomas Ingoldsby." These have long been famous as the "Ingoldsby Legends," and are unsurpassed for their wealth of fun. Though the poet is a humorist, he is not without a serious purpose, and in this, as in most of the other "legends," he exposes superstitious practices with an unsparing hand.

THE Jackdaw sat on the Cardinal's chair !
Bishop and abbot and prior were there ;
Many a monk, and many a friar,
Many a knight, and many a squire,
With a great many more of lesser degree—
In sooth a goodly company ;
And they served the Lord Primate on bended
knee.
Never, I ween, was a prouder seen,
Read of in books, or dreamt of in dreams,
Than the Cardinal Lord Archbishop of
Rheims !

In and out through the motley rout,
That little Jackdaw kept hopping about ;
Here and there like a dog in a fair.
Over comfits and cakes, and dishes and
plates,
Cowl and cope, and rochet and pall,
Mitre and crosier—he hopp'd upon all !
With saucy air, he perch'd on the chair
Where, in state, the great Lord Cardinal sat
In the great Lord Cardinal's great red hat ;
And he peer'd in the face of his Lordship's
Grace

With a satisfied look, as if he would say,
" We two are the greatest folks here to-day ! "

The feast was over, the board was clear'd,
The flawns and the custards had all dis-
appear'd,

And six little singing-boys—dear little souls !
In nice clean faces, and nice white stoles,
Came, in order due, two by two,
Marching that grand refectory through !
A nice little boy held a golden ewer,
Emboss'd and fill'd with water, as pure
As any that flows between Rheims and
Namur,

Which a nice little boy stood ready to catch
In a fine golden hand-basin made to match.
Two nice little boys, rather more grown,
Carried lavender-water and eau-de-Cologne ;
And a nice little boy had a nice cake of soap,
Worthy of washing the hands of the Pope.
One little boy more a napkin bore,
Of the best white diaper, fringed with pink,
And a Cardinal's hat mark'd in " permanent
ink."

The great Lord Cardinal turns at the sight
Of these nice little boys dress'd all in white :
From his finger he draws his costly turquoise ;
And, not thinking at all about little Jackdaws,
Deposits it straight by the side of his plate,
While the nice little boys on his Eminence
wait ;
Till, when nobody's dreaming of any such
thing,
That little Jackdaw hops off with the ring !
There's a cry and a shout, and no end of a
rout,
And nobody seems to know what they're
about,

But the monks have their pockets all turn'd
inside out ;
The friars are kneeling, and hunting, and
feeling
The carpet, the floors, and the walls, and
the ceiling ;
The Cardinal drew off each plum-colour'd
shoe,
And left his red stockings exposed to the
view ;
He peeps, and he feels in the toes and the
heels ;
They turn up the dishes, they turn up the
plates,
They take up the poker and poke out the
grates,
They turn up the rugs, they examine the
mugs—
But no !—no such thing—they can't find
THE RING !
And the Abbot declared that, " when nobody
twigg'd it,
Some rascal or other had popp'd in, and
prigg'd it ! "

The Cardinal rose with a dignified look,
He call'd for his candle, his bell, and his
book !

In holy anger and pious grief,
He solemnly cursed that rascally thief !
He cursed him at board, he cursed him in
bed ;
From the sole of his foot, to the crown of
his head ;
He cursed him in sleeping, that every
night
He should dream of evil, and wake in a
fright ;
He cursed him in eating, he cursed him in
drinking,
He cursed him in coughing, in sneezing,
in winking ;
He cursed him in sitting, in standing, in
lying ;
He cursed him in walking, in riding, in
flying,
He cursed him in living, he cursed him in
dying !—

Never was heard such a terrible curse !
But what gave rise to no little surprise,
Nobody seemed one penny the worse !

The day was gone, the night came on,
The monks and the friars they search'd till
dawn ;
When the sacristan saw, on crumpled
claw,
Come limping a poor little lame Jackdaw ;
No longer gay, as on yesterday ;
His feathers all seem'd to be turn'd the
wrong way.
His pinions droop'd, he could hardly stand,
His head was as bald as the palm of your
hand ;

His eyes so dim, so wasted each limb,
That, heedless of grammar, they all cried,
"THAT'S HIM!"—
That's the scamp that has done this scandalous thing!
That's the thief that has got my Lord Cardinal's ring!"

That poor little Jackdaw, when the monks he saw,
Feebly gave vent to the ghost of a caw;
And turn'd his bald head, as much as to say,
"Pray be so good as to walk this way!"
Slower and slower, he limp'd on before,
Till they came to the back of the belfry door,
When the first thing they saw,
Midst the sticks and the straw,
Was the RING in the nest of that little Jackdaw!
Then the great Lord Cardinal call'd for his book,
And off that terrible curse he took;
The mute expression served in lieu of confession;
And, being thus coupled with full restitution,
The Jackdaw got plenary absolution!
When those words were heard, that poor little bird
Was so changed in a moment, 'twas really absurd.
He grew sleek and fat; in addition to that
A fresh crop of feathers came thick as a mat!

His tail wagged more even than before;
But no longer it wagg'd with an impudent air,
No longer he perch'd on the Cardinal's chair.
He hopp'd now about with a gait devout;
At Matins, at Vespers, he never was out;
And, so far from any more pilfering deeds,
He always seen'd telling the Confessor's beads.

If any one lied, or if any one swore,
Or slumber'd in prayer-time and happened to snore,
That good Jackdaw would give a great "Caw."
As much as to say, "Don't do so any more!"
While many remarked, as his manners they saw,
That they "never had known such a pious Jackdaw!"

He long lived the pride of that country side,
And at last in the odour of sanctity died;
When, as words were too faint his merits to paint,
The Conclave determined to make him a Saint!
And on newly-made Saints and Popes, as you know
It's the custom, at Rome, new names to bestow,
So they canonised him by the name of Jim Crow!

CONTENTMENT

This fine old poem, of which several versions are familiar, was written by Sir Edward Dyer, an English poet and statesman, who lived at the time of Shakespeare. The poem as here given is not quite as it was written, but it is, perhaps, more easy to understand. It is not only admirable for its poetic charm, but its wisdom is clear to all: it points the only way to a contented mind.

MY mind to me a kingdom is,
Such perfect joy therein I find;
As far excels all other bliss
That earth affords, or grows by kind.
Though much I want, which most would have;
Yet still my mind forbids to crave.

Content I live, this is my stay:
I seek no more than may suffice;
I press to bear no haughty sway;
Look—what I lack, my mind supplies!
Lo! thus I triumph like a king,
Content with that my mind doth bring.

I see how plenty surfeits oft,
And hasty climbers soonest fall;
I see how those that sit aloft
Mishap doth threaten most of all.
These get with toil, and keep with fear:
Such cares my mind could never bear.

I laugh not at another's loss,
I grudge not at another's gain;
No worldly waves my mind can toss,
I brook that is another's pain.
I fear no foe, I fawn no friend;
I loathe not life; nor dread my end.

Some have too much, yet still they crave;
I little have, yet seek no more;
They are but poor, though much they have,
And I am rich, with little store.
They poor, I rich; they beg, I give;
They lack, I lend; they pine, I live.

I wish but what I have at will,
I wander not to seek for more;
I like the plain, I climb no hill,
In greatest storm I sit on shore
And laugh at those that toil in vain,
To get what must be lost again.
This is my choice; for why? I find
No wealth is like a quiet mind.

THE TIDE RIVER

The changing nature of a great river that rises "clear and cool" among the hills and flows, ever increasing, through lovely scenes and ugly scenes, by fresh meadows and murky towns, and at length falls into the sea, is described with power and truth in this poem by Charles Kingsley.

CLEAR and cool, clear and cool,
By laughing shallow and dreaming pool;
Cool and clear, cool and clear,
By shining shingle and foaming wear.
Under the crag where the ouzel sings,
And the ivied wall where the church-bell rings,
Undeified, for the undeified.
Play by me, bathe in me, mother and child.
Dank and foul, dank and foul,
By the smoky town in its murky cowl.
Foul and dank, foul and dank,
By wharf, and sewer, and slimy bank.
Darker and darker the farther I go,
Baser and baser the richer I grow.
Who dare sport with the sin-defiled?
Shrink from me, turn from me, mother and child.

Strong and free, strong and free,
The floodgates are open, away to the sea.
Free and strong, free and strong,
Cleansing my streams as I hurry along
To the golden sands and the leaping bar,
And the taintless tide that awaits me afar,
As I lose myself in the infinite main,
Like a soul that has sinned and is pardoned again.

Undeified for the undeified.
Play by me, bathe in me, mother and child.

The Child's Book of SCHOOL LESSONS



READING CLASS

THE WORDS THAT DESCRIBE THINGS

So far in these lessons we have only had words that are the names of persons or things : words like CAT, DOG, LION, SPIDER, SHEPHERD, BABY, and many more besides. But this is not the only kind of word that is used in our language. Supposing you were to see a little negro baby, what would you say ?



Oh,
what a
BLACK
baby !

And if you could by any chance see Goliath walking down the street (only you never will, of course), you would call out :

Oh,
what a
TALL
man !



When Jack Horner was sitting in that corner of his, greedily eating his pie, he said (but it was not true) :



What a
GOOD
boy
am I !

He was not good at all ; he was really very selfish.

Now, these three words, **BLACK**, **TALL**, **GOOD**, are not names of persons

or things, but they tell us something about persons and things. If we want to be very clever and learned, we shall call these words Adjectives ; and we shall call the words that are names of persons and things Nouns. A noun simply means a name, and an adjective means some word added to a name. Try to answer these questions, and the answer will in all these cases be an adjective.

What was the dog that laughed when the cow jumped over the moon ?

LITTLE



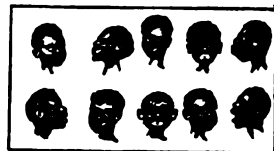
What was the Simon called who met the pie-man ?



SIMPLE

How many little negro boys were there at first ?

TEN



But there is still something more to learn about the words we call adjectives.

Supposing you have a little baby brother who is just beginning to toddle about the nursery. As you hold his hand and help him along, you look down at him and he looks up at you. So, if you were thinking about his height and your height, you would say :

I am **TALLER**
than baby.



But supposing you had *two* little brothers, and you were all three standing in a row, each trying to make himself look as big as possible ; then, if mother were measuring the height of each one of you, she would say (we will call your name Harry) :

"Harry is the **TALLEST** of the three."
So we see that we can alter the word **TALL**, and sometimes make it into **TALLER**, and sometimes into **TALLEST**.

Again, if we had two apples, one large and the other **SMALL**, a greedy boy

would at once put out his hand and snatch the big one, saying to himself :
"The other apple is **SMALLER** than this one."

But if I had seen him do that, I should have made him put it back. Then I should have pulled out a lot of apples from my pocket, and said :

"You shall have the **SMALLEST** of them all." So we have :

TALL TALLER TALLEST
SMALL SMALLER SMALLEST

We use the words in the middle column when we have only *two* things or persons, and measure one by the



TALL



TALLER



TALLEST

other ; and we use the words in the last column when we compare one person or thing with *two or more*.

This is what is called the comparison of adjectives.

WRITING

FIVE NEW CAPITAL LETTERS

"**W**ELL, Nora, do you remember P, B, and R?" asked her mother, when they had their next writing lesson.

"Oh, yes ; and Tom makes them so nicely, mother. Look," replied Nora, as she showed her mother some letters which they had been making.

"Very good, Tom," said his mother encouragingly. "Now you are ready for some new letters. The first one is H ; watch me as I make it."



"You see it has two long down-strokes. The first curves round to the left and ends in a curl, and the second makes a loop over to the first down-stroke, and ends in a curve to the right."

"Two posts like the swing in the garden," said Tom.

"But no ropes hanging down or seat,"

said Nora. "The rope is only looped round the posts at the sides."

"Be careful to keep the two posts the same distance apart," warned their mother ; "and, Tom, the loop should be larger than the one you are making."

Tom tried again, and then he and Nora were shown a letter very like H.

"This is K," said their mother, as she finished making the first one.

"How is it like H, do you think?"



Tom thought the first part was like the left post of H, and told his mother, with a twinkle in his eye, that it had a loop like R, and finished like it.

"See, mother," he said, as he turned over his papers of letters to find R.

"It is in two pieces like H," said Nora.

"You are both right," their mother

replied. "But notice how the second stroke of K curves inwards towards the other, before it makes the loop."

Tom thought this loop would do for the seat of the swing, but Nora thought it was still too high up.

"H and K are much alike, and the next two letters are also much like each other, and easy to make," said their mother, as she wrote the first for them to copy. "This is T."



"That looks so easy," said Nora. "What a funny way to begin! The pencil seems as though it wanted to take a walk before starting in earnest."

"And that little walk," added her mother, "makes it different from another letter, so we must remember T has a turn to start with, then a down-stroke like the first part of H and K, and ends in a curl a little to the left."

"T's turn," said Tom to himself, as he copied his mother's letter; "that will help in remembering it." He was just finishing his line of T's, when he thought of the T-square, and said, "Mother, what about the T-square?"

His mother remembered the talk about the T-square and big T, and she showed him how to make the capital T like a T-square with a straight down-stroke and another stroke across it at the top, like this:



"Many people make capital T like that, so it is necessary you should know how to make both kinds of T."

Nora had seen a signpost with two arms pointing in different directions, where two roads met, and she said that T reminded her of it.

"Does any other letter make a turn first, mother?" she asked.

"Only one," she replied, as she took a pencil to write the next letter, F:



"Like T cut in halves!" exclaimed Nora. "For the only difference is that little stroke across the middle."

F was no trouble at all to make, for, as Tom said, all you had to do was to make T, and cross it like little t.

ARITHMETIC

THE WAY TO MULTIPLY NUMBERS

LET us see now how we are to make use of the multiplication tables which we learned in our last lesson. Suppose we have a question of this sort: "Jack had 32 marbles, and he bought 32 more. How many will he have altogether?" We can, of course, find the answer by adding together 32 and 32, and the work would look like this:

$$\begin{array}{r} 32 \\ 32 \\ \hline 64 \end{array}$$

But, with the help of the table which we made in the last lesson, we do the work in a different way. We wish to find what *two* times 32 makes; so we write 32, and under the unit's figure we write 2.

32 Then say, twice 2 are 4. Put
2 down 4 (in the unit's place).
— Twice 3 are 6. Put down 6
4 (in the "ten's" place).

In many examples we have to "carry" a number, exactly as we do in addition. In fact, we should always remember that "multiplication" is only a convenient way of doing addition when all the numbers to be added together are the same.

If there are 67 houses on each side of a street, how many are there on the two sides together?

We have to find out how much twice 67 makes.

67 In the same way as before
2 write 2 under the unit's figure
— of 67. Then say, twice 7 are
134 14. Put down 4, carry 1. Twice
6 are 12, and 1, 13. Put down 13.

So there are 134 houses—that is, one hundred and thirty-four.

Since the numbers 32 and 67 consist of only 2 figures each, we have almost as much to write when we work these

examples by the help of our tables as we do if we simply add together 32 and 32, or 67 and 67. But, if the numbers are large, then the new way of working gives us much less to write than the old; while, if we have to use the "3 times" table, we have much less to write, whether the number is large or small.

There are 365 days in a year. How many days are there in three years?

Put the 3 under the unit's figure of 365. Say, 3 times 5 are 15. Put down 5, carry 1. 3 times 6 are 18, and 1, 19. Put down 9, carry 1. 3 times 3 are 9, and 1, 10. Put down 10.

If we could not use our tables, our working would be like this, which is much longer than the way we have just done:

365
365
365
1095

We are ready now to make the rest of our tables, up to "12 times 12." We must first write down the three columns of figures which we had at the end of our last lesson.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

You will remember that the second column contained the numbers which we found in our "2 times" table. To get the third column we added the figures in the first two columns: 1 and 2 made 3, 2 and 4 made 6, and so on. This gave us our "3 times" table.

To get the "4 times" table we must add the figures in the first column to the figures in the third column: 1 and 3 make 4, 2 and 6 make 8, 3 and 9 make 12, and so on. The fourth column will then consist of the numbers 4, 8, 12, 16, 20, etc. These must be the numbers we want for our "4 times" table, because we have added the figures 1, 2, 3, 4, etc., to "3 times" those same figures. Clearly, this must give us "4 times" the figures 1, 2, 3, 4, etc. In learning the table we say to ourselves: "4 times 1 are 4, 4 times 2 are 8, 4 times 3 are 12," and so on.

The "5 times" table is obtained in the same sort of way. Add the figures in the first column to the figures in the fourth column, and we get 5, 10, 15, 20, etc., for our "5 times" table.

Then by adding the first column to the fifth we get "6 times." Going on in this way, always adding the first column to the column we have just found, we get the next table, until we reach "12 times."

We must learn these tables perfectly, so that we can say them right through without a single mistake.

MUSIC

THE GOBLINS ON THE LEFT SIDE OF THE FAIRIES

OUR piano fairies have many thoughts. They love to think of the dusky twilight; the rugged rocks are a joy to them; the shimmering gold of the sunshine fills their little hearts with song. Sometimes it makes them feel a little lonely, a little sad, to think they have left the home where fairies first were known. On these days they droop their wee heads, and immediately the little goblin in the small black house on their *left*-hand side knows there is something the matter; and to know that a fairy is in distress is quite too sad a thought for any little goblin.

To-day Fairy G's head is drooping,

and the goblin immediately on her left-hand side asks:

"Why are you looking so sad?"

And she replies that the Spirit of the Twilight is needing her, the rocks of Fairy Glen are calling her, the golden rays of the sun are making a ladder for her, if only she will be up and away.

"But what can be done when so many people call on me?" she says sadly. "If I go, there will be no one to sing for them!"

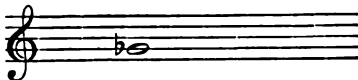
The little goblin is quite excited, because he knows very well that he can make it possible for her to dance in the twilight, to play on the rocks, and to

run up the ladder of golden sunbeams. "Never mind, little Fairy G," we hear him say; "if you look among the many treasures your fairy godmother left you when she carried you into this land called "earth," you will see a funny little charm like this ♭. When a goblin carries this little emblem, he is able to sing for the fairy immediately on his right, and bear her name."

Fairy G hugs the good, kind goblin, and, hunting among her treasures, she discovers the little magic charm, which among our fairies is called a *flat*. She hands it to her wee goblin, who, as we have said, is immediately on her left, and says:

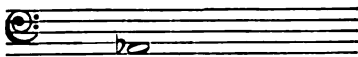
"Dear goblin, I must away. Please sing for me, and everyone shall know you, and call you little G-flat because you wear the magic charm."

The goblin is very happy; but when you press his little black note you will see that it is a little softer, a little lower, or, as fairies say, a little *flatter*, than Fairy G's voice. The small goblin is feeling just a little sad; it was so great a trouble to him to see a fairy unhappy. On this page there is a picture of little Goblin G-flat hiding behind the magic charm, as he takes up his post on Fairy G's second line in the Treble Road



and if you look at all Fairy G's little homes up or down the piano you will always find on her left-hand side a little goblin to sing for her, only the song will be just a little lower and sadder—a little *flatter*.

All the other fairies have the self-same need at different times, so you will find a little goblin on the left of Fairy A, and when he produces the magic charm you will call him "little A-flat."



Look at all Fairy A's houses on the piano, and sure enough the helpful,

kind goblin will be there. Just so will it be with Fairy B.

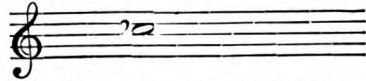


But what about Fairy C and Fairy F? Once again it means a kind little fairy coming to help. Immediately on the left of Fairy C dwells Fairy B, and that means that there is no room for a goblin's house, and poor Fairy C would feel in a great difficulty. But Fairy B cries out:

"Never mind, dear Fairy C, Twilight, Rock, and Sun shall be yours whenever you want, if only you will trust me with the magic charm and lend me your name."

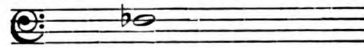
Of course, Fairy C is delighted, and that is how it comes to pass that sometimes Fairy B is seen with the charm, and called little C-flat. Here is

a picture of her when she is singing for Fairy C.

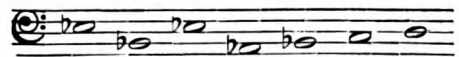
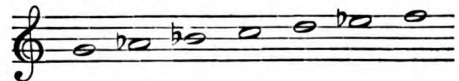


But never forget that the song is softer, lower, flatter. Fairy E is equally kind to poor little Fairy F, for, as you see, no little goblin is to be found on little F's left side. Still, it gives Fairy E the opportunity to be kind and good to her neighbour, and that is one of the beautiful things

piano fairies love. Here is Fairy E carrying the magic charm, and therefore bearing the name of Fairy F:



This time we will have a game of "hide and seek"; the little fairies will be away, and our work is to discover their little flat goblins, and ask them their names.



Goblin G♭



The goblins' magic charm called Flat

COLOURS AND HOW TO USE THEM

IF we could only dip our paint-brushes in the rainbow, what lovely colours we should have to paint with! The red, blue, and yellow which we see there are very different from those same colours in our paint-boxes. Red, blue, and yellow lights make white when they are mixed together; but if we mix those colours in paint we get grey or black. Some colours look better together than others; some make each other more brilliant, and some more dull, if they are near each other.

We will try to see this for ourselves. If someone can give us some coloured papers—red, blue, yellow, violet, green, and orange—we can cut out squares and discs, and try combinations of colour for ourselves. But a better way, if we can manage it, is to paint the shapes on white paper and cut them out.

A pair of compasses, or a tea-cup, will make circles; the squares we have learnt how to make. The circles should measure two inches across—that is, if we use compasses; the distance between the two points—the *radius*—should be one inch. Three other circles should be three inches across, and the three squares four inches. All sides must be alike for a square, you remember.

The three smallest circles we will colour red, blue, and yellow. These three colours we cannot make for ourselves by mixing any others together; they are called the *primary colours*.

Use cobalt for the blue, gamboge for the yellow, scarlet lake for the red. If there is no scarlet lake in our boxes we will mix two reds together—crimson lake and light red.

The three larger circles we will colour with the same colours, and the squares, too. We must wait till they are all dry, and then we will cut out the three small circles, and put them under a heavy book till we want them. The other circles we are going to change into other colours; and if they are quite dry we can begin by damping them very lightly with a sponge, and then blotting them carefully, one at a time.

Now we will cover the blue disc with yellow to make green, the red disc with blue to make violet or purple, and the yellow one with red to make orange.

These are the *secondary* colours; we see them in the rainbow when the primary colours join at the edges.

Now the squares must be turned into violet, green, and orange, in the same way, and left to dry. We can cut out the second circles while we are waiting. When the squares are dry, we change them once more by covering the violet square with orange to make russet or brown; by covering the green square with violet to make olive; and by covering the orange square with green to make citrine.

Now we have what are called *tertiary* colours, and we find them very useful.

When all the squares and circles are cut out, we will try every combination of colour we can think of by placing the circles on the squares, or overlapping them. We shall see how some colours make the others brighter. For example, red is made brighter by green, blue by orange, and yellow by violet.

Let us take a long look at the red disc, then quickly at the white ceiling, and we shall see a greenish spot.

If we look at the yellow setting sun we see the sky full of little blue suns; a long look at blue makes us see orange, if we afterwards look at a white surface.

There are little nerves in the eye for seeing the three colours; if we look too long at one, the nerves that see that colour are tired, and only those that see the two others can work, and so we see green—made of yellow and blue—when we have looked too long at red; violet—made of blue and red—when we have tired the nerves that see yellow; and orange—made of yellow and red—when our eyes have been tired by blue.

So we learn that too much of one colour tires the eyes; we say it dazzles them, and we must put some of the other colours with them to rest the eyes. We can make other experiments with oranges, balls of wool, bright-coloured books, and we shall find how different positions make colours change. Wet sand looks blue instead of brown if the sky is blue above it, and the dirty puddles in the road look golden in the setting sun.

The more we learn about colour the more lovely things we shall be able to see in the world around us.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Aujourd'hui nous irons voir le tombeau de Napoléon avec maman et papa.

To-day we shall go to see the tomb of Napoleon with mamma and papa.

To-day we are going with mamma and papa to see Napoleon's tomb.

Papa appelle un taximètre. Nous montons tous. Bébé reste chez nous.

Papa calls a taximeter. We mount all. Baby remains at the house of us.

Papa calls a taximeter. We all get in. Baby stays at home.

J'aime un automobile, parce que ça va si vite. C'est très agréable.

I like a motor-car, because that goes so quickly. That is very agreeable.

I like a motor-car, because it goes so fast. It is fine.



L'automobile s'arrête, et nous passons par la porte cochère.

The motor-car itself stops, and we pass by the gate for carriages.

The motor-car stops, and we go through the gateway.

Papa dit : " Attendez-nous, s'il vous plait. Nous ne serons pas longtemps."

Papa says : " Await us, if it you please. We not shall be long time."

Papa says : " Wait for us, please. We shall not be long."

Nous entrons. Il y a un grand trou dans le plancher, entouré d'un mur.

We enter. It there has a great hole in the floor, surrounded of a wall.

We go in. There is a big hole in the floor, surrounded by a wall.

Nous regardons en bas. Au-dessous est le tombeau dans une grande salle

We regard in under. At the below is the tomb in a large hall.

We look down. Below is the tomb in a big room.



En arrière du tombeau il y a une grande chapelle. Elle est ornée de drapeaux.

In the behind of the tomb it there has a large chapel. It is adorned of flags.

Behind the tomb is a large chapel. It is decorated with flags.

Il y a des épées aussi. Je désire être soldat comme le grand Napoléon.

It there has some swords also. I desire to be soldier like the great Napoleon.

There are some swords too. I want to be a soldier like the great Napoleon.

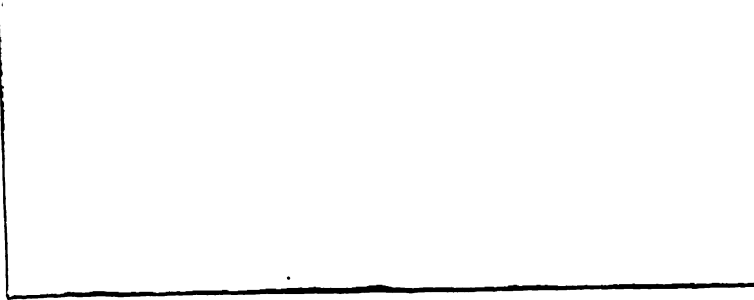
J'ai un livre sur Napoléon. Je le lirai à Jeannette cet après-midi.

I have a book on Napoleon. I it shall read to Jenny this after mid-day.

I have a book about Napoleon. I shall read it to Jenny this afternoon.

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